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EARNINGS MANAGEMENT TO EXCEED THRESHOLDS

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ABSTRACT

Earnings Management to Exceed Thresholds*

Investors are keenly interested in financial reports of earnings because earnings provide important information for investment decisions. Thus, executives who are monitored by investors and directors face strong incentives to manage earnings. We introduce consideration of behavioural/institutional thresholds for earnings in this mix of incentives and governance. A model illustrates how thresholds induce specific types of earnings management. Empirical explorations find clear support for earnings management to exceed each of the three thresholds that we consider: positive profits, sustain-recent-performance, and meet-market-expectations. The thresholds are hierarchically ranked. The future performance of firms that possibly boost earnings to just cross a threshold appears to be poorer than that of less suspect control groups.

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NON-TECHNICAL SUMMARY

Earnings are a primary determinant of stock returns. Earnings also determine executives' rewards, both explicitly through performance-based compensation, and implicitly through promotion and retention decisions. It should therefore come as no surprise that analysts, investors, senior executives, and boards of directors consider earnings the single most important item in the financial reports issued by publicly-held firms. But executives have considerable discretion in determining earnings numbers for any particular period. Within generally accepted accounting principles, executives retain flexibility in the choice of accounting methods, and the timing of sales and expenses. Moreover, they can shift income between time periods by delaying or accelerating expenditures. Thus, executives have both the incentive to manage earnings and the ability to do so.

We label earnings management (EM) the strategic exercise of managerial discretion in influencing the earnings figure reported to external audiences. Our focus is on EM as a response to implicit and explicit rewards for attaining specific earnings thresholds. We analyse executives' motivations for EM. We then sketch a model which shows how threshold-based EM should generate specific discontinuities and distortions in the distribution of observed earnings. Finally, we examine historical earnings data and find support for the predicted patterns.

We identify three thresholds that help drive EM: 1) One penny per share reporting profits is a threshold that arises from the psychologically important distinction between positive numbers and negative numbers (or zero); 2) The quarterly earnings from a previous comparable period functions as a benchmark for current period earnings; 3) Analysts' earnings projections set expectations of performance that can be met, missed, or exceeded.

Executives have a variety of motivations for EM. Information asymmetry may encourage EM: if executives feel that outside observers do not fully understand the firm's performance and its likely prospects, they may manipulate earnings to correct the perceptions of outsiders. Executives may also have their own behavioural biases, and may derive personal satisfaction from making targets. Finally, EM can result from an agency problem: executives may distort earnings reports in a self-serving manner, even if it reduces the firm's value, if their incentives are not fully aligned with those of shareholders.

Thresholds matter to executives because the parties concerned with the firm's performance think in terms of thresholds. This partly results from a psychological tendency to perceive continuous data in discrete form. Partly, it simplifies outsiders' decision-making processes: when bankers must decide whether to extend a loan to the firm, or when a financial analyst must decide on whether to issue a 'buy' recommendation, using a threshold-based rule is convenient. We also argue that threshold effects may be important even if only a restricted set of participants has an intrinsic response to thresholds, because of spillovers effects.

Our model shows that if unmanipulated earnings fall slightly below or above a threshold, executives will engage in EM (up or down) in order to meet the threshold. If unmanipulated earnings fall far below or above a threshold, executives will manipulate earnings downward. Reported earnings distributions should therefore exhibit: 1) a dip to the immediate left of the threshold; 2) a pile-up to the immediate right of the threshold; 3) a fat left tail; 4) a thin right tail.

Our dataset consists of 5387 US firms over the 1974–96 period. The distribution of forecast errors (earnings per share minus the analyst's consensus earnings per share forecast) has the predicted patterns. Consistent with the notion that making the forecast is an important threshold for executives, the forecast error distribution has a pile-up at zero, and falls sharply below zero. For earnings one, two, and three cents above and below zero, there is more density to the right. The tail on the left is fatter, however: for all deviations larger than three cents there is more density to the left, as predicted by our EM hypothesis.

The distributions of change in earnings per share and earnings per share show the predicted pile-up at zero, and dip to the left of zero. We cannot discern tail effects in those distributions.

We investigate whether a hierarchy can be found among the three thresholds we examine. Looking at conditional distributions, we conclude that executives first strive to report profits, then to sustain recent performance, and third to meet analysts' expectations.

Finally, we examine the future performance of firms suspected of having manipulated their earnings in order to meet a threshold. Firms that barely managed to sustain their earnings last year, and whose earnings were up in the fourth quarter, subsequently underperform, both relative to firms that easily made the earnings target, and relative to firms that missed it. We interpret this

finding as additional evidence that firms that barely met a threshold are likely to have pumped up their earnings.

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Earnings Management to Exceed Thresholds

Francois Degeorge, Jayendu Patel, Richard Zeckhauser

I. Introduction

Analysts, investors, senior executives, and boards of directors consider earnings the single most important item in the financial reports issued by publicly held firms. In the medium to long term (one- to ten-year intervals), returns to equities appear to be explained overwhelmingly by the firm's cumulative earnings during the period; other plausible explanations, such as dividends, cashflows, or capital investments, have marginal correlations close to zero (Easton, Harris, and Ohlson, 1992; Kothari and Sloan, 1992). Even for short-term equity returns, earnings are an important explanatory factor. (Ball and Brown, 1968, is the classic early work; see Dechow, 1993, and references therein, for subsequent research that details the relevance of earnings numbers.)

The rewards of a firm's senior executives (hereafter simply referred to as executives) are linked to the firm's earnings (Healy, 1985). Promotions, compensation, and retirement benefits for senior executives depend both implicitly and explicitly on the earnings achieved on their watch. So too do negative events, such as terminations. In these determinations, thresholds such as zero earnings or an improvement in earnings often play a salient role; rewards may change sharply when a threshold is crossed. In addition, there is a substantial trend toward paying executives more in stock options and less in salary; since earnings determine stock values in the long run, this practice effectively ties compensation closely to earnings. But executives have considerable discretion in determining the figure printed in the earnings report for any particular period. Within generally accepted accounting principles (GAAP), executives retain considerable flexibility

in the: choice of inventory methods, allowance for bad debt, expensing of research and development, recognition of sales not yet shipped, estimation of pension liabilities, capitalization of leases and marketing expenses, delay in maintenance expenditures, and so on. Moreover, they can defer expenses or boost revenues, say by cutting prices. Thus, executives have both the incentive to manage earnings, and the ability to do so. It is hardly surprising that the popular press describes companies as frequently engaged in earnings management — sometimes referred to as manipulation.[1]

We label as earnings management, EM hereafter, the strategic exercise of managerial discretion in influencing the earnings figure reported to external audiences (see Schipper, 1989). Our particular focus is on EM as a response to implicit and explicit rewards for attaining specific levels of earnings. We do not determine which components of earnings or of supplementary disclosures are adjusted. Nor do we attempt to distinguish empirically between "real" EM (the strategic timing of investment, sales, expenditures, or financing decisions) from EM involving merely the discretionary accounting of decisions and outcomes already realized.

In this paper, we sketch a model that illustrates how executives strategically influence the earnings figures that their firms report to external audiences, and we examine historical data to confirm such patterns. Our model employs a simple framework of behavioral propensities and a stylized description of the interactions among executives, investors, directors, and earnings analysts to identify EM patterns that generate specific discontinuities and distortions in the distribution of observed earnings.[2]

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[1] See, for example, the multi-page stories in the New York Times of 6/23/96 and 2/16/97. A recent study — Bruns and Merchant (1996) — also concludes that "we have no doubt that short-term earnings are being manipulated in many, if not all, companies."

[2] DeBondt and Thaler (1995) provide a discussion of behaviorally motivated financial decisions by firms.

We identify three thresholds that help drive EM: (1) One penny per share — reporting profits — is a threshold that arises from the psychologically important distinction between positive numbers and negative numbers (or zero). (2) The quarterly earnings from a previous comparable period functions as a benchmark for the current period's earnings. Indeed, firms' quarterly announcements and reports routinely identify and stress results compared to the corresponding quarter from the prior calendar year (due to the annual seasonality of earnings). (3) Analysts' earnings projections set expectations of performance that can be met, missed, or exceeded.

The next section, II, reports briefly on some salient literature from psychology, develops a model based on discrete threshold targets, and draws inferences from the theory and the model. Section III reports on empirical explorations relating to thresholds; we study conditional and unconditional distributions of quarterly earnings over the period 1974-1996. Section IV examines whether firms that are more likely to have managed earnings upward to attain a threshold in a particular year underperform in the subsequent year. Section V suggests future directions, and concludes.

II. A Threshold Model of Earnings Management

Executives' motives for managing earnings, discussed in section II.1, include information asymmetries, agency costs, and behavioral biases. Section II.2 discusses the sources of discontinuities in earnings-based incentives that induce threshold-regarding behavior. Section II.3 traces the consequences of discrete jumps in executives' incentives for EM. We present a stylized model, and find that the resulting distributions of reported earnings exhibit discontinuities: far too few earnings are reported just below the threshold; too many just above it.

II.1 Earnings management by executives

Executives and outsiders are engaged in a game of information disclosure. Investors receive information from analysts — usually indirectly, say through a broker — and through published earnings announcements. They make investment decisions on the basis of this information. To influence investors' actions, executives engage in the costly game of managing earnings, with the result that real earnings are sacrificed. Other parties, such as boards of directors, analysts, and accountants, participate in this game as well, but their choices are exogenous to our present discussion. For example, while boards of directors hire, fire, and reward executives on the basis of their performance, the contingent remuneration actions of boards are already known to executives. Presumably the structure of these pay packages already takes manipulation possibilities into account and may have been adjusted somewhat to counter EM.[3] If so, positive findings are more significant. Executives are assumed to be risk neutral, for convenience; this assumption could easily be relaxed.

We think of accountants as reliable professionals. Their procedures prevent simple misreporting of earnings; indeed, it is the oversight of accountants that makes earnings reports meaningful at all. But accountants are neither omniscient, nor disinterested parties. They can be misled at a cost: usually, this cost leads EM to produce a net negative net present value, summed across all claimants on the firm. (But see the discussion immediately below on the case associated with information asymmetries.)

Executives report earnings, and outsiders attempt to interpret these reports. Reported earnings, R, may deviate from the "true" underlying earnings, or latent earnings, L,

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[3] Dechow et al. (1994) document that compensation committees often override the provisions of incentive plans to avoid providing executives with incentives to behave opportunistically.

because of EM by executives. Represent the level of manipulation as M, where $R=L+M$. M can be either positive or negative, and produces real consequences.

II.1.A Why executives manipulate

EM occurs for a variety of reasons:

Information asymmetries: If executives feel that outside observers do not fully understand the firm's performance and its likely prospects, they may manipulate earnings to correct the perceptions of investors, banks, suppliers, etc. Even if EM turns out to be costly, it may be in the interest of shareholders if it increases the information available to important parties.[4]

Executives may have their own behavioral biases: For example, even if their financial compensation is not markedly affected whether the firm misses or reaches a threshold, it is likely that executives derive personal satisfaction from making targets.

Agency costs: Executives may distort earnings reports in a self-serving manner, even if it reduces the firm's value, if their incentives are not fully aligned with those of shareholders. Full alignment is unlikely. First, the executive's time horizon is shorter than that of the investors: while the value of the stock is the present value of dividends stretching to infinity, the executive will only be in the company for a finite period of time. In the United States, the typical CEO stays with a company for a relatively brief period. If EM were perfectly monitorable, and readily incorporated into the decisions of boards and investors, there would be no distortion (it would be immediately revealed). However, since it is difficult for boards, shareholders, or the stock market to assess future prospects,

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[4] In some settings, manipulated earnings may contain more, not less, information about the firm's true prospects. For example, if a firm's earnings barely meet some threshold, it is likely that the figure has been inflated. But this implies that executives are confident that the cost of manipulation — reduced profits next year — will not be

short-lived executives have an incentive to pump up current earnings at the expense of future earnings that will be realized after they have gone.

Second, executives' compensation, including the probability of continuing in the job, is likely linked to earnings, stock price performance, or both. (See Healy, 1985, or Gaver, Gaver, and Austin, 1995.) If accepting lower earnings today might result in a termination, or will lead to foregoing a bonus, substantially greater earnings tomorrow may well not be attractive.[5] When earnings are drifting toward the unacceptable range, executives' incentives to manage them upward are likely to be significant. However, when maximum or near maximum bonuses are reached, further earnings increases will reap negligible incremental rewards, providing an incentive to rein in today's earnings — that is, shifting them forward — so that future thresholds will be easier to meet. When earnings are so poor that thresholds for bonuses are out of reach, earnings may also be shifted to the future, saving for a better tomorrow.[6]

II.1.B "Real" EM vs. misreporting

Earnings can be managed in two ways: they can be misreported, or income can be shifted across time ("borrowed" from the future). We label the latter "real" earnings management.

A typical misreport might overstate inventories, say by reporting at full value items that are not likely to be sold for their full price. Such reports create a modest time bomb;

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so large as to dramatically reduce the prospect that the firm will meet the threshold next year. Thus, small manipulated profits may contain more information than small unmanipulated profits.

[5] A major benefit of stock options is that they can extend the time horizon for executives.

[6] Executives may also be reluctant to report large gains in earnings because they are concerned that their performance target will be ratcheted up in the future. For example, an executive who has a 10% gain in earnings for year 1 is likely to be rewarded for a further 10% gain in year 2, which yields earnings of 121% of the starting value, but a executive who reaps a 25% gain in year 1 is unlikely to be rewarded for a 3% decline, even though the total yield is 121.25% of starting value. We assume that executives expect ratcheting.

either inventories will have to be revalued downwards in the future, or sales figures will be disappointingly low. Misreports may also downplay the firm's earnings. For instance, the firm may take extraordinary charges in excess of what normal prudence requires when it thinks this reduction will have little consequence.

Earnings can be shifted across time in a variety of ways. A company may defer expenditures that offer ongoing benefits, such as building repairs or employee training. Employees not trained and buildings not painted on a timely basis will create additional expense — beyond today's cost plus imputed interest — in the future. An executive may cut prices temporarily at the end of a quarter or year to boost sales, with the result that these sales are lost next period. Similarly, executives may choose to strategically downplay this year's earnings by consolidating expenses into this year in order to pave the way for a better future. Such behavior is common when a new team takes over the management of the company and can blame disappointing initial results on past leadership.

The earnings borrowings considered here are bad deals — and the larger the borrowing, the worse the deal, since cheap borrowing would obviously be undertaken first.[7] Accounting-based EM — misreporting — has real costs too. The executive may need to coopt the external auditor, perhaps by awarding her a consulting contract (unrelated to her auditor work) of questionable value to the firm. Alternatively, the executive may try to make his misreporting hard for the external auditor to detect. To do so, management needs to weaken internal control mechanisms, including reporting and audit systems, with the undesirable side effect that it will be harder for executives to detect shirking or

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[7] It is conceivable that excessive managerial effort, say an intense sales drive, could temporarily drive up profits. But if the compensation package is fixed, executives are not willing to work at a blistering pace forever. Excess

misappropriation at lower levels in the firm. As a consequence, firm performance becomes lower than it would have been in the absence of EM.

II.2 Why Thresholds

Thresholds matter to executives because the parties concerned with the firm's performance think in terms of thresholds. Consumers of earnings reports comprise a wide class of outsiders, in addition to boards, investors, and analysts. They include, for example, customers and suppliers, who assess the long-run viability of the firm; bankers, who want to be reassured about the safety of their loans; and workers who invest in firm-specific capital, and are therefore concerned about the firm's long-run prospects.

There are both rational and perceptual reasons why many of these outsiders exhibit what we call a "threshold mentality." There is considerable evidence that individuals perceive continuous data in discrete form. For example, we perceive the continuous color spectrum discretely, recognizing seven primary colors. Similarly, if a diagram shades from dark to light and then remains light, humans perceive a bright line where the shading to light stops.[8] More generally, "The tendency to divide the world into categories is a pervasive aspect of human thought" (Glass and Holyoak, 1986). Below we discuss three established demarcations for corporate earnings. In constrast to our vision examples, earnings demarcations draw on external cues.

Our analysis draws a significant distinction between positive and nonpositive absolute earnings. When looking at the norms of a year ago's earnings and analysts' consensus forecast, the salient dividing line is between meeting and failing to meet the norm.

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effort today will be compensated either by money or by lesser efforts in the future. Once again, from the long-term investor's perspective, the loss is not worth the gain.

[8] See Cornsweet, 1974.

Why is 1 cent, not 10 cents or -5 cents the critical reference point for earnings? Why is meeting the norm critical, as opposed to beating it by 10% or falling short by 3%? We believe that these threshold values are critical focal points.[9] In the asbolute earnings context, there is something fundamental about positive numbers in human thinking processes.[10] When comparing performance relative to a yardstick, equality is a salient quality. For example, analysts' consensus forecasts is the level we would expect earnings to achieve.

Many actors rely on rules of thumb to reduce transactions costs, and many such heuristics rely on thresholds. Banks, for example, may grant loans only to firms that report positive earnings; that is, they use a threshold of zero earnings to select firms to be further considered since judiciously adjusting interest rates in response to differential performance may be too hard. EM can also simplify executives' relations with shareholders and boards of directors. For example, when executives report to shareholders, it is cheap and comforting to say that earnings have been up six years in a row. A statement that they have been up five out of six years, and only fell by 1% in the off year, is less easily communicated. This makes it worthwhile to struggle across the threshold of increased earnings. When a firm falls short of analysts' earnings projections, the board may think that the executives did a poor job, and bonuses and awards of stock

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[9] For a seminal analysis of focal points, see Schelling (1960).

[10] Apart from India, the symbol for zero came late and with difficulty to mathematicians. For example, China had to import it from India in the eighth century, and "the mathematicians and astronomers of Sumer and Babylon labored for nearly 1500 years before they introduced the notion of a 'zero' symbol." Negative numbers were much harder still, not becoming "generally recognized as 'numbers' until the sixteenth century" (Barrow, 1992,). In constrast, positive numbers appear to be a more directly grasped concept for humans.

options may suffer. Such doubts do not arise if the analysts' earnings are beaten, even if only by a penny.[13]

Investment analysts typically make discrete recommendations: sell, hold, or buy. Given the discreteness of many decisions, outsiders may quite rationally use a decision rule based on a firm's meeting a cutoff level of performance. For example, bankers will grant a loan, financial analysts will issue a "buy" recommendation, and boards will award bonuses only if a firm's performance exceeds some threshold level, or fire a CEO if it falls below an unacceptable threshold level. Thus, it becomes worthwhile for the executive to struggle to improve performance to surpass that threshold.

Threshold effects may be important even if only a restricted set of participants has an intrinsic response to thresholds. This arises because there are spillovers both across and within classes of participants. Suppose that only one class of participants — say, the bankers — cares whether the firm has reached a specific performance threshold. Executives know their bankers' preference for their performance relative to a target. If other participants (say, financial analysts, suppliers, or shareholders) are aware of executives' desire to cater to their bankers' preference, then whether the firm has met the performance threshold will also matter to these other outsiders, for they know executives cannot lightly risk raising the bankers' ire. Thus, by reaching the threshold, executives will not only cater to the banker's preference, but also to the other participants' rational perceptions through inference. [14]

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[13] President Clinton, recognizing the role of thresholds, announced that he was seeking to secure 50% of the 1996 presidential vote so as to claim a mandate. Not surprisingly, he struggled hard in the final days to get more than 50%. (In fact, he won 49.2% of the actual vote.)

[14] To be sure, one can argue that any special preference of any class of outsiders can spill over to other outsiders. For instance, consider an extreme case in which the firm's shareholders includes a group of mathematicians who insist that earnings per share should be a prime number. Might financial analysts be favorably impressed when earnings per share are a prime number? Probably not, for several reasons. First, the class of outsiders with exotic preferences must be prominent enough that executives will take them into consideration. Second, if a class of

There may also be spillovers within a class of participants, such that the consequences of threshold-regarding (TR) behavior by a minority may prove to have an impact much more than proportional to a 100% TR world. For example, the levels of earnings management in a world where 25% of boards of directors respond naturally to thresholds may be much more than 25% as great as in a world where all boards are threshold driven. Consider a situation where an executive, threatened with modestly negative results, does not know how his own board will respond. If it is TR, it will fire him with probability 0.4; if is not TR, his job is safe. If he knew he faced a TR board, he would manage earnings to get them into the positive range. Suppose that the executive assesses some chance of being fired when he does not know his board's orientation. This may be sufficient to induce the same earnings management. If so, TR behavior by a small proportion of boards spills over to potentially affect the behavior of large numbers of executives.

Spillovers might also arise from a lemons-type of unraveling due to signaling. Say the costs of EM beyond the threshold depend on the quality of the firm; and better firms can manage earnings more cheaply. Given TR behavior by some participants, slightly negative or barely positive earnings become a signal. In theory, only a firm above some critical quality q^* would find it profitable to manipulate a particular amount, from say -3 to +1. But then firms that reported -3 would be advertising they were below q^*, as opposed to mixing in with firms reporting +1, which includes many above q^* who are managing their earnings. This gain in perceived quality — from the mean below q^* to the mean above q^* — will lower the cutoff. This signaling feature expands the number of

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investors has preferences that are very inconsistent with those of other outsiders, executives can argue that they intentionally did not cater to these exotic preferences, to avoid going against the preferences of the majority. In contrast, specific threshold preferences are more likely to spill over: a number of outsiders are likely to exhibit "spontaneous" threshold mentality; and attempts by executives to accommodate threshold mentality do not obviously go against the interests or preferences of any class of outsiders.

firms that will manage their earnings in response to any particular set of TR incentives. Return to the world where some boards are TR and some are not, but assume, in contrast to the situation above, that a manager can distinguish his board's type, although the world cannot. Even if a manager knows his board is not TR, he may manage earnings (with his board's approval) if he can do so inexpensively, so as not to send a negative signal to the world.

II.3 Three thresholds

Reports in the financial press suggest that executives care about three thresholds when they report earnings:

(1) report profits, that is, report earnings that are above zero;

(2) sustain recent performance, that is, make at least last year's earnings; and

(3) meet analyst expectations, particularly the analysts' consensus earnings forecast.

Absent behavioral motives on the part of some participants, it is hard to see why executives would strive to report positive earnings per se. Thus, if there were merely an agency loss due to a short time horizon, it would be as important to manage earnings from -5 cents to -1, or +6 to +10, as to move from -3 to +1. Any evidence that reporting positive profits is an important goal for executives supports the notion that behavioral motives are an important determinant of thresholds.

Prospect theory (Kahneman and Tversky, 1979), which describes behaviors of individuals choosing among risky alternatives, tells us that individuals behave as if they evaluate outcomes as *changes* from a reference point. The reference point is usually the decision-maker's current state (wealth), and it shifts over time, and sometimes with how the decision is framed. The amount of shifting can dramatically affect choices since: there is a sharp break in the utility function at the reference point (zero change), and the overall

curve is S-shaped (that is, it is convex for losses and concave for gains). If the preferences of executives, the boards that review them, or the investors who trade the firm's stock are consistent with the predictions of prospect theory, then executives will have a threshold mentality and are likely to manage reported earnings. The thresholds they will wish to reach are the reference points in the value functions of the participants, which are likely to be bright lines or focal points.

The "meet analysts' expectations" is special among our three thresholds, since human conjectures play a role in creating it. Published earnings forecasts (such as those in the IBES database we employ) are produced by sell-side analysts, and reflect a complicated set of incentives. While analysts try to publish accurate estimates, large errors are probably less than proportionately penalized[15], and the penalty may depend on an analyst's accuracy relative to his peers, rather than absolute accuracy.

Moreover, accuracy is by no means the only objective pursued by analysts, most of whom are on the sell side. Such analysts face pressures to be optimistically biased in an effort to generate trading commissions (favorable reports and forecasts induce customers to buy shares of firms with good prospects) as well as to avoid losing their privileged information sources within the companies they follow. Several studies have documented that on average, analysts' forecast exceed reported earnings.[16]

The analyst consensus estimate is also different from our other thresholds because it is endogenous. While we argue that executives try to report earnings that exceed analysts' forecasts, it remains obviously true that analyst's forecasts anticipate reported earnings.

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[15] That is, a 40% forecasting error probably entails a penalty less than twice that incurred for a 20% forecasting error. Certainly, the loss function is less than quadratic, the least squares norm.

[16] See Abarbanell and Bernard, 1992, and references therein. However, Keane and Runkle, 1994, employing data disaggregated by individual analyst, claim to find unbiased forecasting once account is taken of cross-sectional industry correlations and discretionary asset write-downs.

A complicated game ensues, in which analysts try to predict an earnings number which will then be manipulated based on their prediction. Moreover, anecdotal evidence suggests that executives, realizing the importance of meeting or exceeding the analyst consensus, actively try to influence analysts' expectations downward, especially when the earnings announcement date draws near.[17]

II.4 A two-period model – threshold of meeting last period's earnings

This sub-section explores how EM to reach thresholds affects the distribution of reported earnings. We study a simple two-period model with a threshold set at meeting last year's earnings. In each period $t = 1,2$, the firm gets a random draw of "latent" or true earnings, L_t, which are independent and identically distributed (normal with mean m and standard deviation s). These latent earnings are not observed by outsiders, who only see reported earnings R_t. In period 1, executives can manipulate reported earnings R_1 by choosing an amount M_1 to add to earnings, such that $R_1 = L_1 + M_1$. The cost of manipulation is paid when there is full settling up in period 2:

$$R_2 = L_2 + k(M_1),$$

where $k(0) = 0$, $k' < 0$, and $k'' < 0$. Pumping up reported earnings today results in lower reported earnings tomorrow, and one extra dollar today results in the loss of more than one dollar tomorrow. If period 1 manipulation is negative (executives rein in earnings), then reducing reported earnings by one dollar today boosts next year's earnings by less than one dollar.

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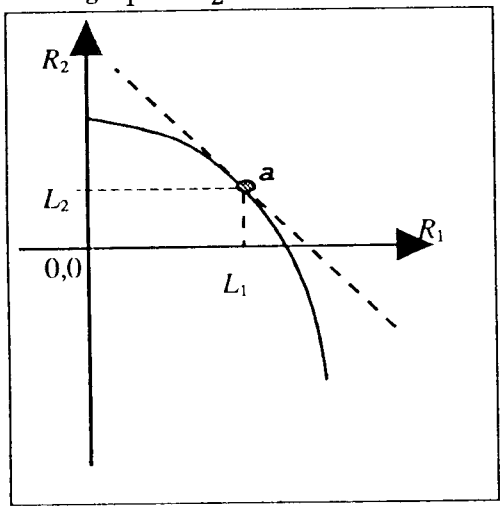
[17] See "Learn to manage your earnings, and Wall Street will love you," Fortune, March 31, 1997. This article tells the story of a meeting between Microsoft's Bill Gates, his CFO, and financial analysts, during which the Microsoft executives paint a particularly bleak picture of the company's future. At the end of the meeting, Gates and his CFO congratulate each other when they realize that their goal of depressing analysts' expectations has been achieved.

We assume that latent earnings are independent and identically distributed in the two periods (normal with mean μ and standard deviation s).

Figure 1. Reported earnings in period 2 as a function of those in period 1, holding L_1 and L_2 fixed.



The executive exits after period 2 and we assume that all is revealed at that point. We have the tradeoff indicated in Figure 1. Point **a** corresponds to M_1=0 and thus $R_1 = L_1$. As shown, the slope of the tradeoff curve at **a** is -1 for the case of a zero discount rate. (More generally, the slope will be -(1+r), where r is the one-period interest rate corresponding to a non-zero time value of money.)

We assume that the executive's expected reward schedule falls sharply at one or more thresholds, such as negative earnings, or earnings below last year's. Below such thresholds, he might risk termination, or at least a substantial cut in bonus. For simplicity, we assume that at all earnings levels other than at the thresholds, the incentives for better performance are positive and constant. (In practice, we suspect that they are steep near a threshold, and more tempered at either extreme.)

In each period, the executive receives payoff $f(R_t, B_t)$, where R_t is the reported earnings performance and B_t is the benchmark against which the performance is assessed.[18] Possible benchmarks include the performance during a previous comparable

[18] If part of the executive's reward were to be hired for the next period, this stationarity would not exist if the executive was expecting to retire soon.

period, target earnings level (which may be a forecast, quite possibly by outsiders such as analysts), or positive absolute earnings (i.e., being in the black).

If the manager meets or surpasses the benchmark, he receives a bonus $v(R_t, B_t)$. Why this sharp escalation of rewards at the benchmark? Consider a principal-agent framework, with an agent who must receive at least his reservation utility, and a prohibition on negative payments, as seems realistic for corporate executives. It seems appropriate to concentrate the agent's rewards in the range where outcomes are most likely, assuming his effort is roughly equally productive everywhere. Thus, if the most likely outcome for a firm is just to meet the analysts' consensus forecast, with a rapid fall-off in density on either side, then it makes sense to have an agent have a strong incentive for movements from just below to just above the consensus forecast. By contrast, incentives should be relatively weak substantially well below the forecast, since the agent is unlikely to be operating there. Given the no-negative compensation constraint, if the principal were to create strong incentives to improve on unlikely poor performance, the agent might well have to get paid too much on average.

Mere risk aversion among executives toward period rewards (or of shareholders to period earnings) could lead to attempts to smooth earnings through EM. To keep matters simple, we assume that executives are risk neutral with respect to their rewards.

For our two-period illustration, the executive selects M_1 to maximize

$$f(R_1, B_1) + \delta E\left[f(R_2, B_2)\right],$$

where E denotes expectation, and δ is the discount factor. The executive's direct rewards from current period performance are indicated by β. Thus, we posit the following form for f:

$$f(R_t, B_t) = \beta R_t + v(R_t, B_t), \text{ where: } v(R_t, B_t) = \gamma \text{ if } R_t \geq B_t$$
$$= 0 \text{ otherwise.}$$

The previous period's reported earnings serve as the benchmark. The benchmark will be R_0 for the first period, which is normalized to zero for exposition, and R_1 for the second period.[19] Thus the $v(R_t, B_t)$ term induces a ratcheting effect. Ratcheting of standards if well-known in the contexts of worker productivity, procurement and regulation, and is primarily studied for its disincentive effects on first-period effort.[20] For example, "The regulator infers from a high performance an ability to repeat a similar performance in the future and becomes more demanding." (Laffont and Tirole, 1993, p.664). The earnings management context introduces the additional possibility of reducing and thereby "storing" some earnings to meet future thresholds, a feature not available say with worker productivity.

Managing earnings is an imprecise science, relying on estimates of both latent earnings and the effects of any attempts to boost earnings. Latent earnings may well be higher or lower than expected. We analyze two cases: in case 1, the executive knows L_1 precisely when he selects M_1; this case describes misreporting of earnings. In case 2, the executive only has an imprecise estimate of L_1 when he chooses M_1; this case describes "real" EM.

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[19] We are assuming stationarity in the latent earnings distribution. This might be considered unrepresentative of the real earnings process that has a random walk characteristic. If latent earnings do follow a random walk, and we keep the same ratcheting structure in the payoff function, the manipulation behavior will be identical close to the threshold (M_1=L_1). Away from the threshold, firms will manipulate by a constant amount regardless of L_1: ratcheting combined with the random walk assumption ensures that the executive's decision problem is invariant to L_1.

[20] See Milgrom and Roberts, 1992, pp. 233-236, and Laffont and Tirole, 1993, pp. 381-387.

Case 1: the executive knows L_1 precisely when he selects M_1. In this setting, the primary element of the executive's strategy is intuitively clear. Select R_0 equal to 0 for convenience. If $L_1 < R_0$, select M_1 to achieve the threshold and reap the bonus, unless the entailed loss on L_2 in expected value terms proves too costly.

If L_1 is slightly below 0, then it will be worthwhile to select a positive M_1 — the executive should borrow future earnings to make the bonus. While manipulation will sacrifice a greater amount of second period earnings and raise the hurdle for the second period, it will allow the executive to earn the bonus for sure now, only sacrificing it with some chance in period 2. The borrowing will prove well worthwhile, except in the unlikely case when it proves to sacrifice next period's bonus.

If L_1 is significantly below 0, then it may be too costly to manage earnings to cross the threshold. To determine this, the executive compares two quantities. The first is his expected payoff if he manipulates just enough — i.e., selects M_1 so that $R_1 = 0$ — to secure the bonus. The second is his optimal strategy foregoing the bonus. For the second, he actually selects a negative value of M_1, making it more likely he will reap the bonus next period. We call this "saving for a better tomorrow." Significantly reining in earnings when latent earnings are disappointing is referred to in the literature as "taking the Big Bath."

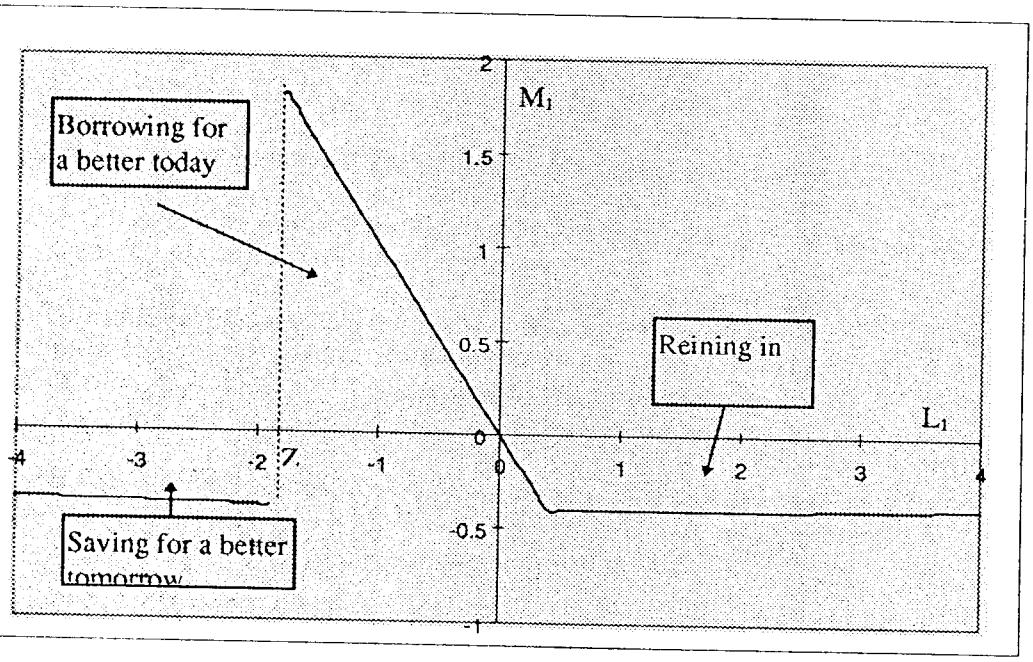
If L_1 is above R_0, then there is no reason to boost earnings. Indeed, for $L_1 > R_0$, some reining in will increase the likelihood that the executive will earn the next period's bonus; reining in lowers the period 2 hurdle, and it transfers some earnings to the second period.

To illustrate, we choose $R_0 = 0, \beta = 1, \gamma = 5, m = 0, s = 5, \text{and } \delta = 1$; which implies that $L_1 \sim N(0,5)$, and $f(R_1) = R_1 + v(R_1, 0)$. Figure 2 illustrates the executive's optimal strategy

as a function of latent earnings L_1. The initial threshold is achieved where

$L_1 + M_1 = R_0 = 0$.

Figure 2. Manipulation, M_1, as a function of latent earnings, L_1
Threshold: Meet Last Period's Earnings; $R_0=0$



Our key finding is that in the neighborhood of zero, the optimal strategy is to set $M_1 = -L_1$; future earnings are borrowed to meet today's earnings threshold. At point Z, the payoff from choosing $M_1 = -L_1$ (and therefore M_1 is positive, indicating borrowing) is equal to the payoff from saving for a better tomorrow (taking the optimal sacrifice in earnings). Left of Z, the optimal bath gives a higher payoff than striving. Right of Z, borrowing gives a higher two-period payoff. Hence the discontinuity in the graph.

At $L_1 = 0$, the executive undertakes no earnings management: he is already getting his bonus. When L_1 is small and positive, it pays to rein in, so that reported earnings just sneak beyond the threshold (recall that in this initial version of the model, R_1 can be targeted perfectly, so there is no risk of missing zero earnings). Then, in a region immediately to the right of 0, the executives again choose $M_1 = -L_1 < 0$. As L_1 becomes larger, it becomes too costly to rein in completely (the concavity of the k function more than outweighs the incremental chance it affords to make the second-period bonus).

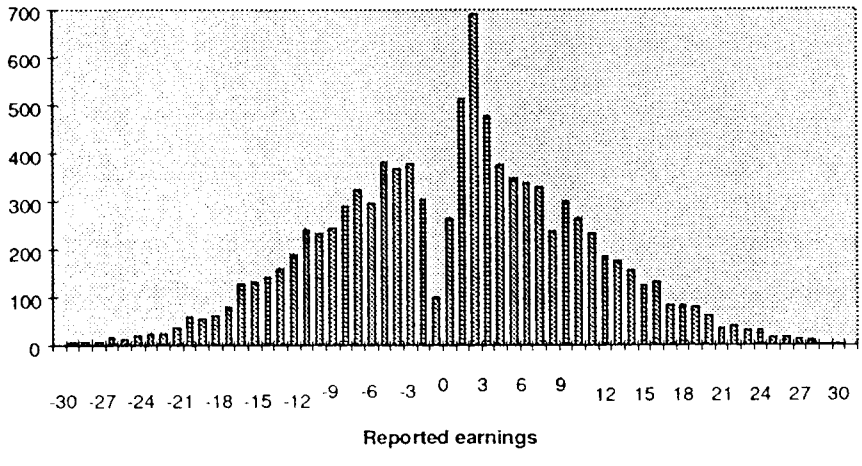
Figure 2 suggests three patterns that we should expect to see if executives misreport earnings. First, EM creates a gap in the earnings distribution just below the threshold (0 in this case). Second, for a range of values of L_1, a profit just sufficient to meet the threshold is recorded. Third, the level of reported earnings will be a sharply discontinuous function of expected latent earnings.[21]

[21] This will make reported earnings very difficult to predict. Thus, executives' manipulations could explain why analysts' forecasts are often wrong. Roughly 45% of analysts' estimates fall outside a band of 15% plus or minus the actual earnings. See Dreman and Berry (1995a, p. 39).

Case 2: the executive only has an imprecise estimate of L_1 when he chooses M_1. The executive has a prior probability distribution on L_1 centered on the true value L_1, with variance σ^2. Now, when the executive needs to set an $M_1>0$ to cross the threshold, he will have to choose a value higher than under the case of certainty. Also, there will be instances when the observed earnings will indeed be small negative, i.e., lie between Z and 0. This arises with imprecise knowledge of L_1 because there will be ex post realizations when the selected M_1 proves insufficient because L_1 ends up toward the bottom of its expected range.

We developed a new example incorporating uncertainty, setting $\sigma^2=1$, and using the same parameter values employed in our prior example. Figure 3 shows the distribution of reported earnings based on 20,000 draws of latent earning values. The distribution of earnings realizations is reported with a bin width of one unit. As expected, the density of reported earnings shows a dip just below 0, and a pile-up at and slightly above the threshold.

Figure 3. Simulated distribution of reported earnings, R_1. The executive only imprecisely knows the latent earnings, L_1, when choosing the manipulation level, M_1.



Note that there is a dip in the distribution to the left of zero, though the extreme outcome of zero density immediately to the left of zero when the executive has perfect knowledge of L_1 does not appear. The maximum hump is shifted to the right of zero because executives will undertake some EM even when the mean of their prior distribution of L_1 is above the threshold; they hedge against the uncertainty. We use this simulated distribution of R_1 as a benchmark to which we compare the empirical distributions shown below.

In results not shown, we explored the consequences of changing the parameter values of this model. We find that the changeover point Z, (where L_1 is negative and the payoff from borrowing to meet the threshold is equal to the payoff from taking the optimal sacrifice) is affected by the discount factor: the higher the executive's discount rate, the

more valuable it is to get high earnings this period, and the costlier it is to take a bath;hence the changeover point Z moves to the left.

If second period earnings are made more uncertain, executives manipulate more to secure the bonus in the first period. Borrowing levels that would normally sacrifice next year's threshold are less likely to do so when earnings variability is great. The greater is earnings variability, the less the effect that borrowing from the second period has on the likelihood of securing the second-period bonus.

As the bonus for crossing the threshold (calibrated by γ) falls in importance relative to the rewards per unit of reported earnings (calibrated by β), EM becomes more costly and decreases. For any level of L_1, M_1 is closer to 0 as β increases. For the distribution of the reported earnings, R_1, there is a smaller pile-up just above the threshold, corresponding to a smaller dip to the left of the threshold. Increasing β makes manipulation more expensive. Where manipulation had been most extreme, therefore, the executive saves for a better tomorrow instead.[22]

In the next two sections, we relate the results from the model to the data on earnings to study the evidence for EM. In section III, we examine the distributions (both unconditional and conditional) of reported earnings over 1974-96. In section IV, we report on statistical support for the hypothesis that future earnings are lower if current earnings are likely to have been manipulated upwards to attain a threshold.

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[22] One might wonder whether our results extend to a multiperiod setting. With more than 2 periods, there are factors that make borrowing earnings both more and less valuable. They would be more valuable because there would be no danger that they would be "wasted," that is, more than enough to secure the second-period bonus. They would be less valuable because executives could always borrow in the second period to make the bonus.

III. Evidence of Earnings Management to Exceed Thresholds

Simple thresholds significantly influence executives' management of earnings. It is impossible to monitor M directly, so we evaluate the indirect evidence provided by the values of R.[23]

Our empirical analyses explore the extent to which managers manage earnings to attain our three thresholds: (1) "report profits", i.e., achieve 1 cent or more in earnings; (2) "sustain recent performance", that is, meet or surpass the most recent level of comparable earnings, (which, given seasonal variation, is the corresponding quarter from the previous year); and (3) "meet market's expectations", that is, meet or exceed the consensus forecast of analysts. We study the density function for earnings near each threshold. If managers do indeed manage earnings to meet a threshold, we expect to have "too few" earnings directly below it, and "too many" directly above it. Of course, we do not expect findings as stark as those our model generates due to numerous additional factors, including heterogeneity among firms in both earnings distributions and EM potential.

Subsection III.1 briefly discusses the sample and the construction of variables. In subsection III.2, we present three univariate histograms that provide evidence of EM across each of the three thresholds. For each histogram, we report the results of a statistical test that the discontinuity at the conjectured threshold is significant. Details of the test method are discussed in the Appendix. Finally, in subsection III.3, we explore conditional distributions to rank the importance of the three thresholds.

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[23] See Dechow, Sloan and Sweeney, 1995, on the problems of estimating the level of discretionary accrual activity.

III.1 Data and Construction of Variables

Our dataset consists of quarterly data on 5387 firms providing partial or complete data over the 1974-1996 period. To conveniently align of quarterly observations, we drop firms whose fiscal years do not end in March, June, September, or December. While the total number of observations exceeds 100,000, the number of available observations is much smaller for many of the analyses. For the 1974-1984 period, the sample includes only the mid-capitalization or larger firms for which Abel-Noser (now maintained by Q-Prime) provides data on analysts' forecasts of earnings. The reported earnings per share are from Compustat (item #8, which excludes extraordinary items). For the post-1984 period, we employ the IBES database, which reports quarterly earnings as well as analysts' forecasts (83,680 observations).

We represent the market forecast by the mean of the analysts' forecasts for the contemporaneous quarter. Such forecasts are usually available around the middle of the ending month of the quarter. (The financial results for a quarter are announced by firms about four weeks into the next quarter — typically slightly later for the fiscal-year-ending quarter, and somewhat earlier for the other three quarters.) According to IBES, analysts forecast earnings that do not include unusual or non-recurring charges, and so the reported earnings per share (*EPS*) variable we use excludes extraordinary items. Thus, any evidence of EM we uncover excludes managerial strategies employing extraordinary items.[24]

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[24] Philbrick and Jones (1991) argue that analysts' forecasts do not account for special items, especially asset sales, that affect reported earnings. They recommend that the reported earnings before extraordinary items also be purged of the after-tax effects of asset sales. See also, Keane and Runkle (1994).

There are some large outliers in the set of reported earnings recorded by IBES in the post-1985 sample that could be corrected by cross-checking with Compustat data. However, since our analysis focuses on observations in a region far from the tails of the distributions, this problem of possibly spurious outliers is not significant for us. In our analyses, we do not make adjustments to the *EPS* numbers coded by I/B/E/S for the post-1985 sample.

III.1.A Normalization of earnings

In testing our hypotheses, we pool data from firms that vary widely on size and share price. For example, the median firm size in our sample during the 1980s, as measured by its average market capitalization, is $128 million; the inter-quartile range of market capitalizations is $353 million. The corresponding values based on price per share are $12.77 and $11.88. We need to address the potential heterogeneity that results from drawing quarterly results from such a wide range of firms.

The literature commonly normalizes *EPS* by deflators such as price per share or assets per share in an attempt to homogenize the distribution from which the different observations are drawn. However, because *EPS* is measured (and reported and forecast) rounded to the closest penny, spurious patterns can arise in the distribution of such normalized *EPS* absent adequate precautions. (This problem appears to have been overlooked previously.[25]) For example, exactly zero *EPS* (or change in *EPS* or forecast error) occurs with nontrivial probability because of the rounding (as does any specific value like one penny). However, a zero remaps to zero after deflation compared to, for instance, a one-penny *EPS* that can remap into a relatively large or small number depending on the deflator. Thus, deflation can lead to a spurious build-up in the density at zero, a critical area of interest for our study. In simulations not shown, this problem proves significant under conditions where *EPS* are rounded off to the nearest penny (as in practice).

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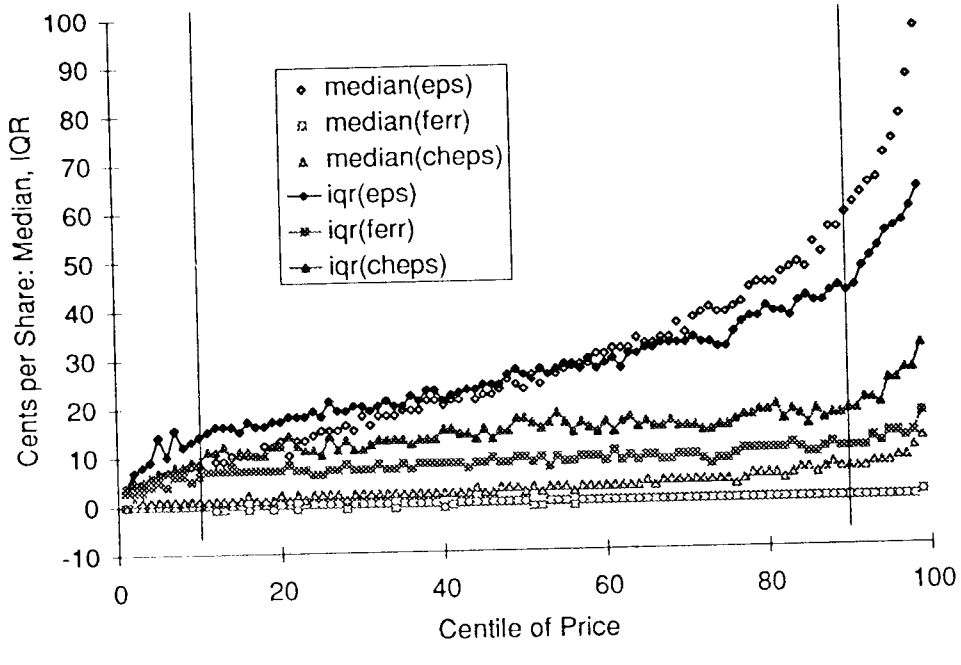
[25] This problem is analogous to the "aliasing problem" in the literature on the spectral analysis of time-series analysis (for example, see Koopmans, 1974, chapter 3). The classic aliasing problem arises when the spectrum of interest is a continuous-time series but the available sample was sampled at discrete intervals. In this situation, either lack of prior knowledge of the specific bounds of the frequency interval in which the spectrum is concentrated, or an inability to sample often enough, results in accurate estimates of the *sampled* process spectrum providing poor or misleading estimates of the original spectrum. In our setting, the estimate of the probability density function risks distortion due to the initial rounding-off (discretization) of EPS and any subsequent renormalization.

Fortunately, if we exclude the extreme firms in terms of price then deflation to correct for possible heterogeneity proves unnecessary for the important variables related to EPS that we study. Figure 4 below shows the medians (represented by hollow symbols) and interquartile ranges (represented by corresponding solid symbols which are connected) of the important variables as a function of centiles of price per share.

Figure 4. Medians and inter-quartile ranges for *EPS*, *FERR*, and ΔEPS as a function of centiles of price per share



The best situation for our study would arise if the measures of location (median) and dispersion (inter-quartile range) proved to be homogeneous across the different centiles. Consider for instance the analysts' forecast error (*FERR*), constructed as the reported *EPS* minus the mean of the analysts' forecasts. In Figure 4, *FERR*'s median and interquartile range are indicated by squares. These measures are reasonably independent of price per

share if we focus on the middle 80% of the sample indicated as the region between the two vertical lines drawn at 10% and 90% in Figure 4. Consider the case of the change in earnings per share, denoted ΔEPS, which is simply *EPS* minus *EPS* of 4 quarters ago. The distribution of ΔEPS, like *FERR*, appears stable in the middle 80% of the sample given Figure 4. In the analysis that follows, we restrict our sample to the middle 80% of the sample that delivers reasonable homogeneity.

We further analyzed the sample for heterogeneity due to variation across different time periods. For the culled sample of the middle 80%, time variation in the distribution proved not to be a major problem.

However, the situation for the basic *EPS* series itself is not resolved by our restriction of the sample to the middle 80%. *EPS*'s median as well as interquartile range increase steadily throughout the centiles of price per share, as is readily seen in figure 4. Therefore, in any analysis with *EPS*, we avoid aggregating the distribution across the whole sample. For *EPS*, we report results with quartiles of the middle 80% (i.e., 11%-30%, 31%-50%, 51%-70%, and 71%-90% from the pre-culled sample).

III.2 Historical Evidence of Earnings Management

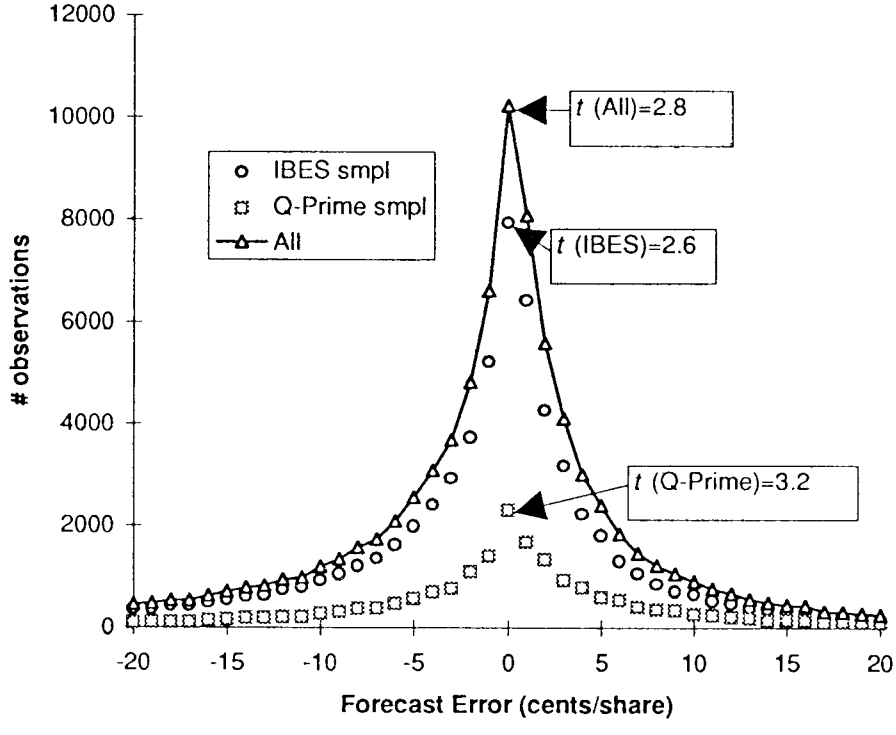
The hypotheses about threshold-driven EM predict discontinuities in earnings distributions at specific values. As a first cut, we assess empirical histograms, focusing on the region where the discontinuity in density is predicted for our performance variables. Second, we compute a test statistic telling us whether to reject the null hypothesis that the distribution underlying the histogram is continuous and smooth at the threshold point. Unfortunately, established statistical tests do not appear to be available to test such hypotheses. Our statistical testing approach is discussed in the Appendix.

To construct empirical histograms requires a choice of bin width that balances the need for a precise density estimate with the need for fine resolution. Scott (1992) and Silverman (1986) recommend a bin width positively related to the variability of the data, and negatively related to the number of observations; for example, one suggestion calls for a bin width of $2(\text{IQR})n^{-1/3}$ where IQR is the sample interquartile range of the variable and n is the number of available observations. Given our sample sizes and dispersions of variables, such formulas imply a bin width of one penny (the minimum resolution for our data).

III.2.A "Meet Analysts' Expectations"

The empirical distribution of the forecast error, *FERR*, which equals *EPS* minus the analysts' consensus *EPS* forecast, is plotted in one-penny bins in a range around zero. Figure 5 shows the distributions for two sub-samples (IBES and Q-Prime samples) as well as the overall sample.

Figure 5. Histogram of Forecast Error for Earnings Per Share:
Depicting the threshold of meet analysts' expectations



The results prove similar across the three samples. Consistent with the notion that "making the forecast" is an important threshold for managers, the distribution of *FERR* drops sharply below zero: We observe a smaller mass to the left of zero compared to the right. (Note that in the histogram, the bin starting with 0 represents observations that are exactly zero.) For earnings 1, 2, and 3 cents above and below 0, there is more density to the right. However, the tail on the left is fatter; for all deviations larger than 3 cents there is more density to the left, which implies the lesser density for -1, -2, and -3 cents is

significant, and not due say to right skewness. This pattern — with too little density just below zero — is predicted by our EM hypothesis.

There is an extra pile-up of observations at zero, although this is hard to see for a distribution like *FERR* that is centered on zero itself. The pile-up is confirmed by the τ-statistic, which always proves to be larger than 2.0 for the zero threshold point (specifically, 2.8 for the overall sample, 2.6 for the IBES subsample and 3.2 for the Q-Prime subsample) compared to absolute values for τ of less than 2.0 for all the neighboring points (unreported).

Previous studies on analysts' forecasts have reported an "optimistic bias": on average, analysts' forecasts exceed reported earnings. Optimistic bias in the mean of forecasts works against our contention that executives will manage reported earnings to meet or exceed analysts' forecasts. This in turn suggests that a supportive finding will be more meaningful.

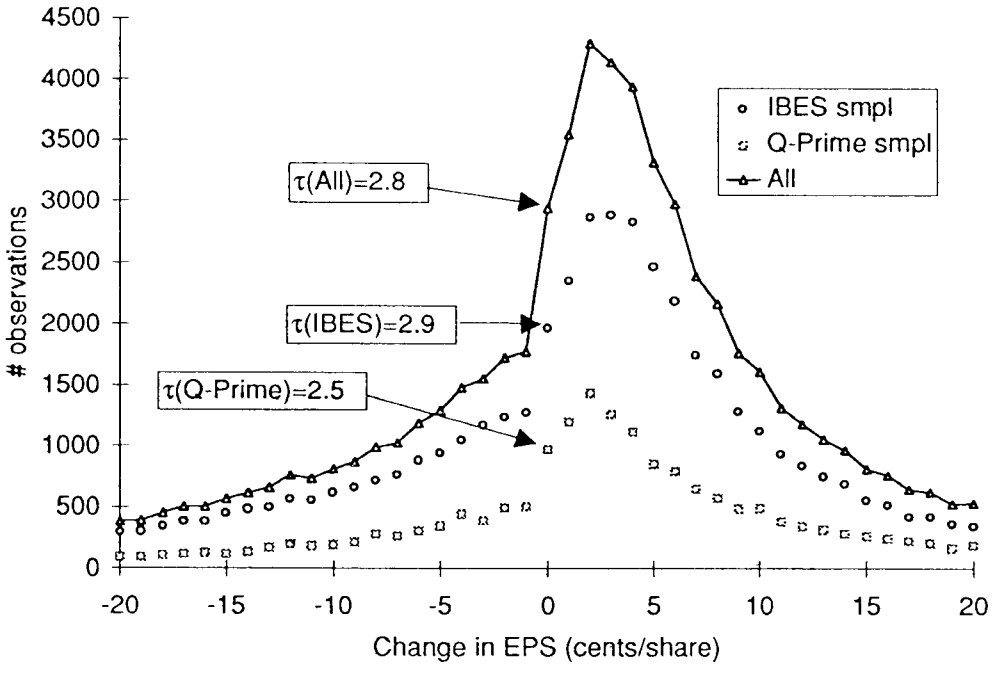
Fortunately, the two forces that may explain the data in Figure 5 — EM to attain or exceed the forecast, and a mean optimistic bias in the forecast — can be reconciled. It is sufficient that most of the time executives meet or slightly exceed analysts' forecasts, but that they sometimes fall dramatically short. In such a case, the forecast error distribution will be skewed, with a long left tail. This pattern appears in our sample: the mean of *FERR* is -5.43 while the median is 0; the skewness measure computes to -43 (whose p-value is near zero under the null hypothesis of a symmetric distribution). This confirms a statistically significant left-skewed distribution of earnings relative to forecast.

III.2.B "Sustain Recent Performance"

Press reports on corporate earnings typically compare current results with those from a year ago. Consistent with this practice, we provide evidence that earnings from one year

ago constitute an important threshold for earnings reports, as we posited in our model. The distribution of the change in earnings, denoted ΔEPS, is simply EPS minus EPS of 4 quarters ago. (The appropriate recent available benchmark proves to be the corresponding quarter from a year ago since earnings exhibit strong annual seasonal variation.) The distribution of ΔEPS is plotted in Figure 6 for two sub-samples (IBES and Q-Prime samples) as well as the total sample.

Figure 6. Histogram of Change in EPS ($\Delta EPS = EPS_t - EPS_{t-4}$): Exploring the threshold of sustain recent performance



Since corporate earnings tend to grow (surely in nominal terms), we do not expect the central tendency of the distribution to be close to zero. Indeed, the median and the mode of the distribution of the overall sample are 3 cents while the mean is 0.84 cents. It is all the more remarkable, then, that we observe a large jump in the distribution at zero. In

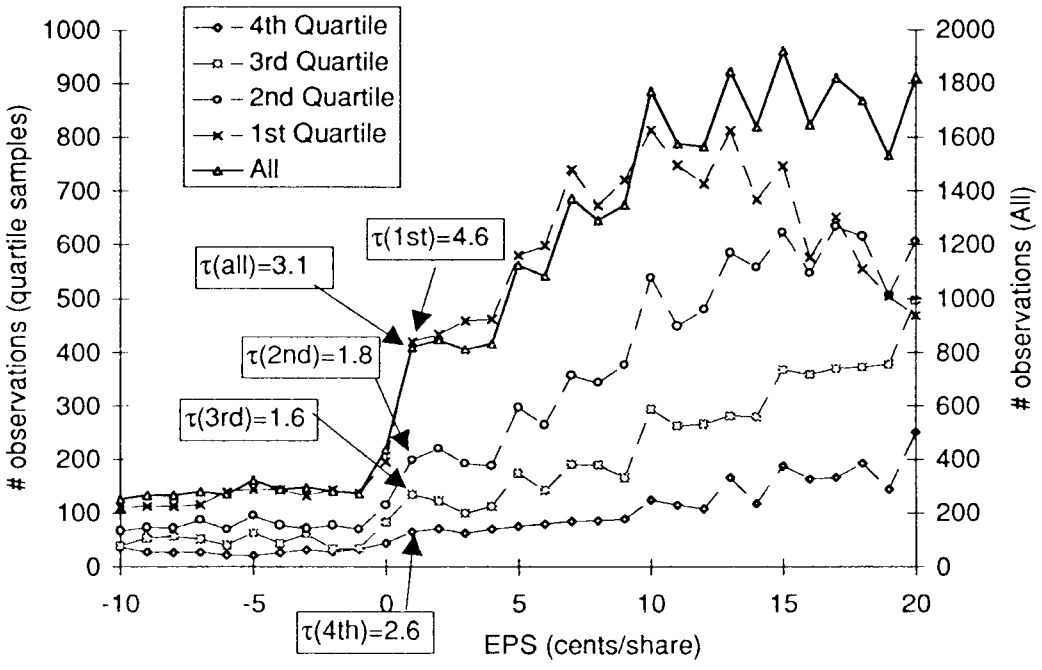
the region of small negative changes, the distribution appears to have been "shaved," with some density mass transferred to zero or slightly above. This pattern of ΔEPS is consistent with managers' managing earnings to come in at or above the comparable figure for four quarters ago. A similar pattern is reported in Burgstahler and Dichev (1995; Figure 1), though they deflate earnings by market value and thus induce excess density at zero; the extreme dip in density just below zero in their distribution of scaled earnings is also most likely spurious due to the deflation they employ (as discussed in III.1.A above).

The easily discernible pile-up of observations at the zero threshold for ΔEPS is confirmed by the associated τ-statistic that comes in at 2.8 for the overall sample, 2.9 for the IBES subsample, and 2.5 for the Q-Prime subsample (compared to absolute values for τ of less than 2.0 for all the neighboring points (unreported)).

III.2.C "Reporting Profits"

Our third possible important threshold is perhaps the most natural: positive earnings. To know whether this threshold has been reached, investors need no information on the company's performance history, or on the market's consensus forecast. This threshold also addresses the most important question for shareholders: Is this firm profitable? The complication for studying a distribution of *EPS*, as discussed previously, is that the distribution is not homogeneous with respect to price per share. Thus, in Figure 7, we show the distribution of *EPS* in a window around zero for the overall sample as well as for subsamples based on quartiles of price per share. (Higher quartiles have fewer observations included in the diagram.)

Figure 7. Histogram of *EPS*:
Exploring the threshold of positive profits



Note that the pattern with the overall sample (vertical scale on the left) is very similar to the pattern obtained with the subsample of the 1st quartile (vertical scale on the right). Clearly for the higher quartile subsamples, the observations around zero are much scarcer; hence, the impact of the overall sample around zero is dominated by the effects from the 1st quartile. We discuss below, nonetheless, that the threshold of reporting positive earnings is meaningfully present in all four samples.

Focus on the distribution of *EPS* with the total sample (or the subsample of the 1st quartile). Two patterns emerge. First, similar to ΔEPS, the *EPS* distribution appears to be shaved in the negative region, consistent with the hypothesis of loss aversion. Second, the *EPS* distribution shows a considerable jump between 0 and 1; thus, it appears that

managers strongly desire to be able to report strictly positive earnings — as opposed to just breaking even. Note that this figure reinforces the impression of Figure 1 in Hayn (1995), who, however, scales *EPS* by price per share and thus obtains a confounding density estimate at zero (as discussed above in subsection III.1.A). The τ-values confirm the observable pattern: at one cent per share, we obtain τ-values of 3.1 for the overall sample and 4.6 for the subsample of the 1st quartile, thus confirming a positive discontinuity in the *EPS* distribution there.

Although the τ-values at one cent per share with the higher quartile subsamples are less impressive, they lie in the right direction. (If we magnify the vertical scale, an upward kink becomes apparent for these subsamples.)

Finally, we can also detect a upward kink in the *EPS* distribution from -1 cent/share to 0 cents/share indicating a secondary threshold at zero, "avoid red ink." Though the τ-values for the secondary kink prove insignificant, in this case we don't want to override our visual impression since our construction of the τ-test makes it insensitive to identifying small discontinuities in the neighborhood of a larger one.

In sum, we have established clear thresholds effects in the reporting of earnings both visually in plots and through statistical test results. The three thresholds affecting reporting of earnings relate to "meet analysts' forecasts", "sustain recent performance", and "report profits". The movement from 0 to 1 cent also proves informative for profits.

III.3 Conditional Distributions: Interaction Among Thresholds

If executives pay attention to more than one threshold, as seems likely, which thresholds matter more? Do thresholds act as substitutes or complements? Is there a discernible hierarchy among them?

To investigate interactions between thresholds, we analyze the conditional distributions of *EPS*, ΔEPS, and *FERR*, when the two other thresholds are and are not met. Twelve conditional distributions are of interest (three individual distributions × conditioning on the other two × two levels). To help sort through the patterns we adopt the following terminology: If threshold A is met or exceeded, we denote that by met-A; if a threshold A is not met, we denote that by not-A. We define the following relations:

- Threshold A is "robust" to threshold B if executives try to attain threshold A whether we condition on met-B or not-B.
- If A is robust to B and vice versa, we assert that A and B are "independent" thresholds.
- Threshold A "complements" threshold B if efforts to attain threshold A appear important when conditioned on met-B but not when conditioned on not-B.

- Threshold A "substitutes for" threshold B if threshold A matters when conditioned on not-B but does not matter when conditioned on met-B.[26]

Using this terminology, the evidence provided by the twelve conditional distributions can be summarized as follows (see Figures 8 to 10).

1. The report-profits threshold ($EPS \geq 0$) is robust to the sustain-recent-performance threshold ($\Delta EPS \geq 0$) and the meet-market-expectation threshold ($FERR \geq 0$). The conditional distributions of *EPS* exhibit discontinuities at zero that appear consistent with efforts by executives to avoid reporting a negative *EPS* if possible.
2. The sustain-recent-performance threshold ($\Delta EPS \geq 0$) appears robust to meet-market-expectation threshold ($FERR \geq 0$), but only complements the positive profits threshold. In panels A and B, there appear to be discontinuities at zero in ΔEPS conditioned on market expectation. In panel C, we observe a similar discontinuity for met-positive profits. However, in panel D, there is no longer a threshold-attaining discontinuity at zero for not-positive profits.
3. The meet-analysts'-expectations threshold ($FERR \geq 0$) appears to be the weakest of all, merely complementing the positive profits and sustain-recent-performance thresholds. In panels A and C, the met-threshold conditioning cases, we observe a likely threshold-attaining discontinuity. In contrast, in panels B and D, the not-threshold conditioning cases, we do not observe a left-discontinuity at zero. If at all, there appears to be a right-discontinuity that is inconsistent with executives' managing earnings to reach thresholds.

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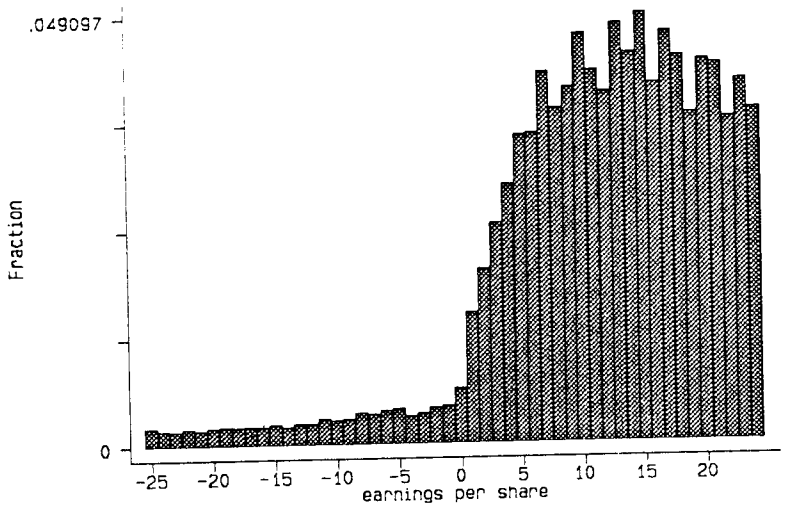
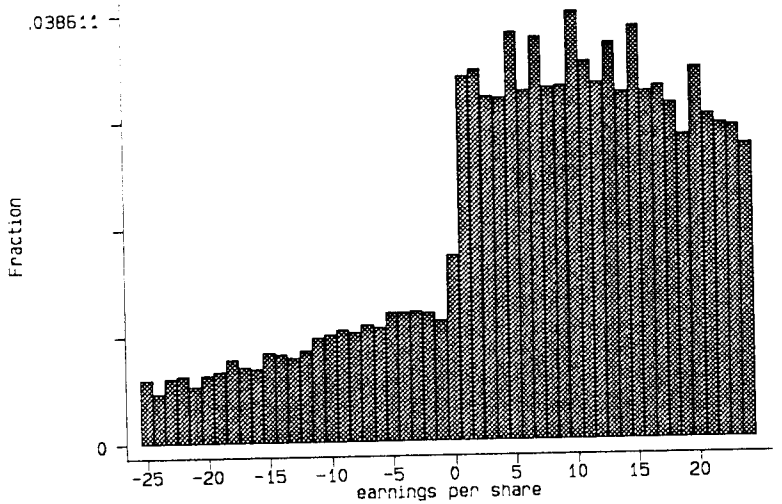
[26] Since the unconditional distributions of all three distributions under study (*EPS*, ΔEPS, and *FERR*) exhibit jumps at the threshold, the fourth logical case — both conditional distributions showing no jump — seems unlikely.

Figure 8: Conditional Distributions of *EPS*

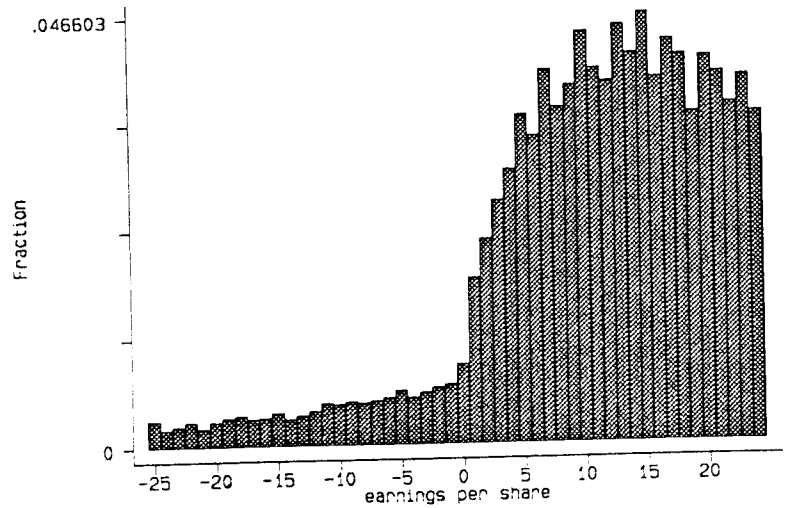
A. conditional on AFERR ≥ 0



B. conditional on AFERR<0



C. conditional on $\Delta EPS \geq 0$



D. conditional on ΔEPS <0

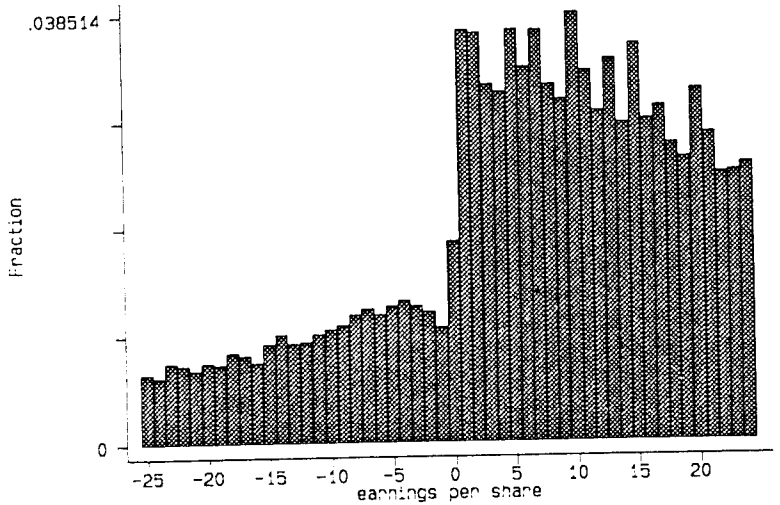
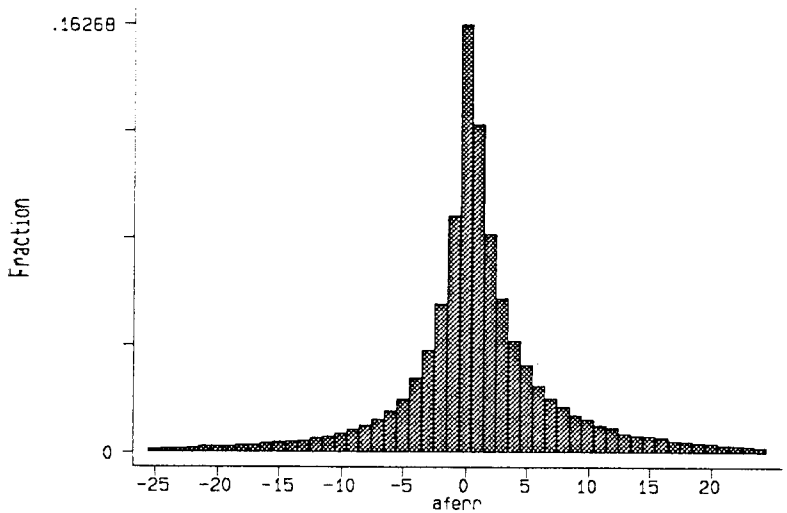
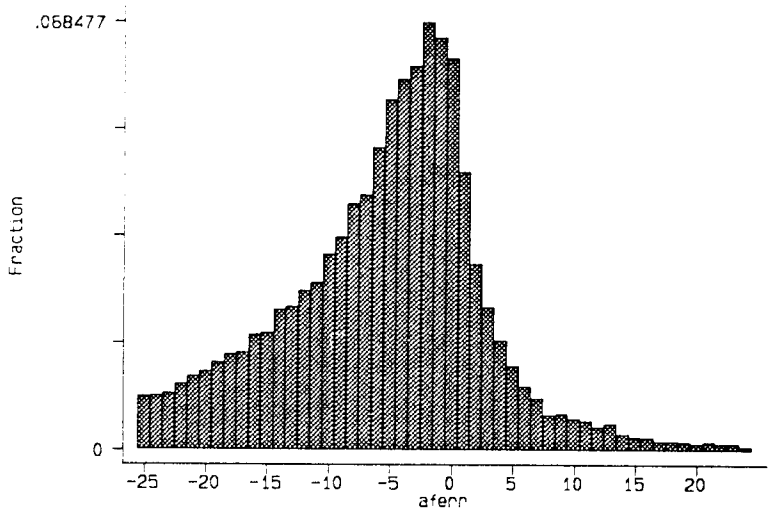


Figure 10: Conditional Distributions of AFERR (Analysts' Forecast Error)

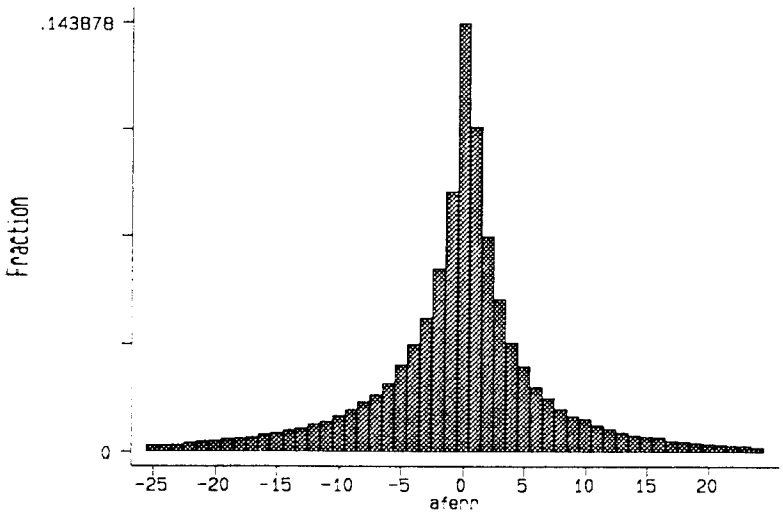
A. conditional on $\Delta EPS \geq 0$



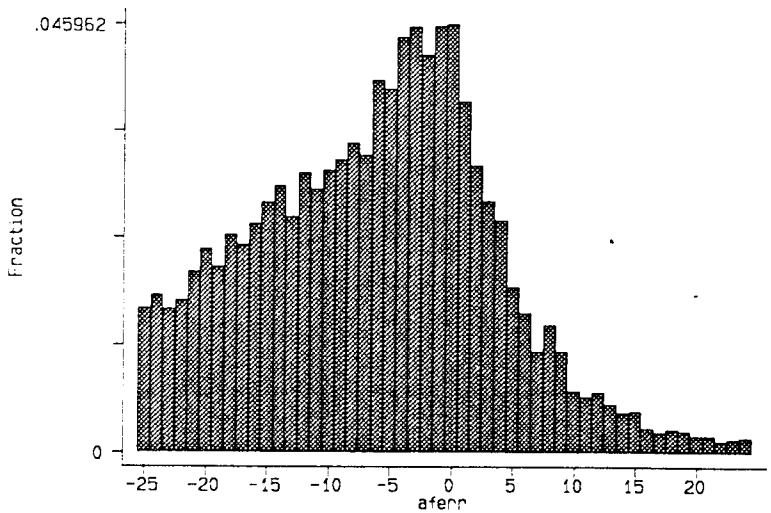
B. conditional on $\Delta EPS<0$



C. conditional on $EPS \geq 0$



D. conditional on $EPS<0$



Potentially, our inferences from the conditional distributions may be driven by purely mechanical effects. For example, if earnings were positive last year, it is impossible to reach them this year if the firm is making losses. Thus, the distribution of ΔEPS conditional on earnings being negative is only interesting if we also condition on year-ago earnings being negative. Similarly, if the consensus forecast exceeds year-ago earnings, and $\Delta EPS < 0$, the firm cannot make the analyst forecast even if executives would like it to. Thus, the distribution of *FERR* conditional on $\Delta EPS < 0$ is only interesting if we also condition on the consensus forecast being less than year-ago earnings. Finally, if the consensus forecast is positive and earnings are negative, the firm cannot make the consensus forecast even if executives would like it to. Thus, the distribution of *FERR* conditional on earnings being negative is only interesting if we also condition on the consensus forecast being negative. We constructed the histograms of the conditional distributions along these lines, and our conclusions on threshold hierarchy were not altered.

In summary, a hierarchy of thresholds emerges: Executives first strive to report profits, then to sustain their recent performance, and only third to meet analysts' expectations.

IV. Impact on Future Earnings from Earnings Management

In the previous section, we showed evidence that executives manage earnings to meet three thresholds. But, as discussed in section II, reports of current earnings are raised by "borrowing" from future earnings. From an empirical perspective, firms that barely attain a threshold should be suspected of having conducted such upward earnings management. This section studies whether the future performance of such firms appears adversely affected compared to control groups that are less suspect.

IV.1 Implication of EM for Future Earnings

If there is earnings management to meet thresholds in any given period, it should also affect the next period's earnings. Thus, we explore whether there is any predictable impact on earnings in the period following a period with likely EM. We divide firms into three groups, depending on their earnings. Group A fails to meet analysts' earnings, B just meets or exceeds them, C beats them easily. Group B is likely to include a number of firms that managed their earnings upwards to meet the threshold. Group C is less likely to have boosted earnings, and may have reined them in. Denote the average performance of the group by the corresponding lower case letter, and indicate the period of the performance by a subscript (1 or 2). Looking to the future, if EM is significant we expect that the earnings prospects for group C, c_2, would be more favorable than those for group B, b_2. But C companies did better in the initial period ($c_1>b_1$) and since earnings display persistence, a finding of $c_2>b_2$ would not confirm the EM hypotheses.

To get a more secure inference, we introduce an additional group of A companies, those that failed to meet the threshold in the first period. The performance order of the three groups in period 1, by construction, is $c_1>b_1>a_1$. With more likely EM in the B group in period 1, in the second period we expect to see that B companies do worse relative to C than A does relative to B. That is, $c_2-b_2>b_2-a_2$. (Earnings persistence alone suggests $c_2>b_2>a_2$; EM only suggests $c_2>b_2$ and $a_2>b_2$; combining earnings persistence with significant EM, the predicted performance ordering for period 2 becomes $c_2>a_2>b_2$.)

IV.2 Evidence on the "Borrowing" of Future Earnings

Consider the threshold "sustain recent performance" (i.e., $\Delta EPS=0$). We study the fiscal year performance of firms since we expect fiscal year effects to be the most powerful

ones. We study the subset of firms whose fiscal year ends in December to avoid overlapping-in-time observations. Moreover, firms that manage earnings for a given year are likely to show an uptick in the last quarter's performance, and we therefore restrict attention to this subsample. (Concerns regarding spurious inferences induced by this artifact of the sample choice are addressed below.) We construct four groups of firms for this sample as follows:

	All firms with December-ending fiscal year that satisfy [*EPS*(last quarter) - *EPS*(4 quarters ago)] ≥ 0			
Group label:	A. Miss Threshold	B. Meet Threshold	C. Surpass Threshold	D. Strongly Surpass Threshold
Range of Δ(fiscal year *EPS*) in cents:	-10 to -1	0 to +9	+10 to +19	+20 to +29

A widely accepted stylized fact is that a large component of earnings changes is permanent.[27] Moreover, the coefficient in the projection of next year's expected ΔEPS on the current year's realized ΔEPS proves non-negative. (That is, β is found to be positive in an estimated relation like: $\text{expected}(\Delta EPS_{t+1}) = \alpha + \beta \Delta EPS_t$; in fact, $\alpha \geq 0$ too.) Thus, a reasonable null hypothesis is that the ranking of firms by ΔEPS in the next year will either be uncorrelated with their groups or that it will be positively related. For example, we find that the "strongly surpass threshold" group consistently outperforms the "surpass threshold" group. However, if there is significant EM, we expect that the "meet threshold" group — many of whose members having presumably borrowed earnings — will underperform the groups immediately above ("surpass threshold") *and* below ("miss

[27] The earnings literature notes that loss-reporting firms have different time-series properties of *EPS*. However, all our inferences prove robust to conditioning on the sign of *EPS*.

threshold"). This conjecture assumes that the EM-effect exceeds any normal persistence in performance. This is a very different and sharp prediction.

Table 1 reports the mean and median of relative performance by group for the year following the formation of the groups. For completeness, the tables also shows results for the larger sample of all firms using rolling 4-quarter performance measures.

Table 1. Means and medians of next year's relative performance by group formed using initial year's ΔEPS.

	Group's Performance in Formation Year			
	Miss Threshold	Meet Threshold	Surpass Threshold	Strongly Surpass Threshold
A. Sample of firms with December-ending fiscal years; groups formed at end of fiscal year				
# observations	398	1177	1463	1071
Mean ΔEPS for following year	9.2	7.0	7.5	13.7
Median ΔEPS for following year	13.5	9.0	13.0	18.0
B. Sample of all firms; groups formed every quarter using rolling 4-quarter results				
# observations	1767	5131	7156	4765
Mean ΔEPS for following year	13.8	7.8	10.4	13.5
Median ΔEPS for following year	16.0	9.0	13.0	17.0

We find the pattern predicted by significant amounts of earnings management: the future performance for the group that just meets the threshold is worse than both the miss threshold group and (less surprisingly given general persistence in ΔEPS) the surpass threshold group.

The pattern will be reinforced if "saving for a better tomorrow" occurs for the group just missing the thresholds, or if surpassing firms "rein in".[28]

Parallel to the analysis shown above for the threshold of "sustain recent performance", we examine the "report profits" threshold. Now groups are formed based on 4-quarter *EPS* performance. As before, we focus solely on firms that report a current quarter uptick in performance, i.e., $\Delta EPS>0$. Since there are relatively few observations in the region of zero *EPS*, we don't further apply fiscal year filters. Given the problems of heterogeneity for *EPS* identified in Figure 4, we also studied the subsample of firms that were in the smallest quartile of price per share. Results (not reported) are qualitatively similar.

Under the null hypothesis, there is no strongly expected order across groups for relative performance (i.e., annual ΔEPS) in the post-formation year. Summary results parallel to Tables 1 & 2 are reported in Table 3.

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[28] There may be some concern that the results in Tables 1 & 2 may be spuriously induced because we select firms that have $\Delta EPS>0$ in the most recent quarter. For instance, consider the miss-threshold group: it missed the annual threshold despite reporting relatively decent earnings in the latest quarter. This might imply that this firm is experiencing a rapid upward performance trend (compared to the meet-threshold group). If so, and given general persistence in earnings changes, we may expect that the miss-threshold group would outperform the meet-threshold group in the next year without any reliance on earnings management. We check for this effect by using selection criterion of $\Delta EPS>10$ and $\Delta EPS>20$ for the most recent quarter. Given the construction of our groups, if the observed results in Tables 1 & 2 arise purely due to the $\Delta EPS>0$ filter then we expect the meet-threshold group to outperform the surpass-threshold group with the $\Delta EPS>10$ filter, and the surpass-threshold group to outperform the strongly-surpass-threshold group with the $\Delta EPS>20$ filter. This does not turn out to be the case in our sample. The only performance reversal is observed between the miss-threshold group and the meet-threshold group.

Table 3. Means and medians of next year's relative performance by group formed using formation year's level of annual *EPS* (5-cent bins)

	Group's Performance in Formation Year				
	Strongly Miss Threshold	Miss Threshold	Meet Threshold	Surpass Threshold	Strongly Surpass Threshold
# observations	140	157	231	253	277
Mean ΔEPS for following year	42.0	37.2	10.9	8.4	21.5
Median ΔEPS for following year	38	35	10	18	18
Wilcoxon test results compare each group's performance with that of the next group:					
Wilcoxon test	0.63	3.44	-0.51	-0.78	n.a.

Note: Under the null hypothesis that the distributions of performance by the two groups being compared are the same, the Wilcoxon test is distributed standard normal ($N(0, 1)$). The p-values corresponding to test outcomes of $|2.5|$ and $|3.5|$ are 0.0124 and 0.0005 respectively.

While the meet-threshold group significantly underperforms the miss-threshold group (Wilcoxon test value of 3.44), the meet-threshold group is not reliably outperformed by the surpass-threshold groups. In this case of the annual *EPS* threshold, we cannot conclude that the meet-threshold group (which has more likely managed earnings) "borrows" a significant amount of earnings from the immediate following year.

V. Concluding Discussion

Analysts, investors, and boards are keenly interested in financial reports of earnings because earnings provide critical information for investment decisions. Boards of directors charged with monitoring executives' performance recognize the importance of earnings to the firm's claimants and link managerial rewards to earnings outcomes. That this nexus of relations generates strong incentives for executives to manage earnings is hardly

surprising. This analysis introduces the importance of thresholds for performance in this arena, and the consequences they have for patterns of reported earnings.

In work-in-progress that takes the threshold-based EM documented in this study as a given, we study how the equity market accounts for expected EM in resetting prices upon announcement of earnings. Other on-going investigation includes: whether analysts' efficiently account for EM in setting and revising their earnings forecasts; the salience of fiscal year thresholds; and whether different types of firms — such as growth and value stocks — respond to the different incentives to manage earnings that are created because they suffer different penalties from falling short of thresholds.[29] Finally, though we don't take up the task but many accounting researchers have and continue to do so, it is important to detail exactly how executives achieve thresholds in periods where they might otherwise fall short, and preserve earnings for future periods when current thresholds are clearly either met or failed. For example, which discretionary accruals get manipulated, and by how much?

Our model shows how efforts to exceed thresholds induce specific types of EM. Earnings just falling short of thresholds will be manage upwards. Earnings far from thresholds, whether below or above, will be reined in, making thresholds more attainable in the future. Our empirical explorations find clear support for EM driven by three thresholds:positive profits, sustain-recent-performance, and meet-analysts'-expectations. We observe discontinuities in the earnings distributions that indicate threshold-based EM. From explorations with conditional distributions, we infer that the thresholds are

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[29] Dreman and Berry (1995b, pp. 23-24) find that low-P/E (bottom quintile) stocks fared better after a negative earnings surprise — actual earnings below the consensus forecast — than did high-P/E (top quintile) stocks. For a one-year holding period, average annual market adjusted returns were +5.22% for the low-P/E stocks, but -4.57% for the high-P/E stocks. The annualized differential for the quarter in which the surprise occurred was somewhat greater, +7.05% versus -5.69%.

hierarchically ordered; it is most important to make positive profits and least important to meet analysts' expectations. We also find evidence that the future performances of firms just meeting thresholds appear worse than those of control groups who are less suspect.[30]

Although earnings are a continuous variable, outsiders and insiders use psychological bright lines such as zero earnings, past earnings, and analysts' projected earnings as meaningful thresholds for assessing firms' performance. Theory suggests, and data document, that executives will manage earnings in predictable ways to exceed thresholds.

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[30] In related work not reported in this paper, we have explored whether the special saliency of annual reports creates additional incentives to manipulate earnings. We find that the pressure to sustain-recent-performance at the fiscal year horizon induces extra noisiness in fourth quarter earnings that varies predictably with the temptation to "generate" earnings to meet the threshold.

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Appendix

Testing For A Discontinuity in A Univariate Distribution

Let x be the variable of interest (such as the change in earnings per share). The null hypothesis, H_0, conjectures that the probability density function of x, say $f(x)$, is smooth. Given a random sample of x of size N, we estimate the density for discrete ordered points $x_0, x_1, \ldots, x_n$, etc.[31] Suppose the points are equispaced; and without loss of generality set the distance between the points to be of length 1. We compute the proportion of the observations that lie in bins covering $[x_0, x_1)$, $[x_1, x_2)$, ..., $[x_n, x_{n+1})$, etc. These proportions, denoted $p(x)$, provide estimates of $f(x)$ at $x_0, x_1, \ldots, x_n$, etc.[32]

The expectation of $\Delta p(x_n)$ [$\equiv p(x_n) - p(x_{n-1})$] is $f'(x_n)$, and its variance depends on the higher derivatives of $f(x)$ at x_n as well as the available sample size N. Consider a small symmetric region R_n around n of $2r+1$ points (i.e., $R_n = \{x_i; i \in (n-r, n+r)\}$); given the smoothness assumption for $f(x)$ under H_0, the distribution of $\Delta p(x_i)$ will be approximately homogeneous.[33]

Use the observations $\Delta p(x_i)$ from R, excluding $\Delta p(x_n)$, to compute a t-like test statistic, τ. Specifically, compute $\tau_n = \dfrac{\Delta p(x_n) - \underset{i \in R, i \neq n}{mean}\{\Delta p(x_i)\}}{\underset{i \in R, i \neq n}{s.d.}\{\Delta p(x_i)\}}$, where *s.d.* denotes the sample standard

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[31] For our analyses, the x's are integers though nothing in our test approach requires this.

[32] Under H_0, improved estimates of $f(x)$ are possible using neighborhood bins. However, the power of tests to reject H_0 (especially given our alternate hypotheses discussed below) may be compromised by such an approach. Fortunately in our case, unambiguous results obtain with this most simple estimation strategy.

[33] For our analysis, we selected r=5, which creates a 11-penny intervals. Briefly, we explored r=7 and r=10 for Δeps — the qualitative findings remain unchanged.

deviation. We exclude $\Delta p(x_n)$ in the computation of the mean and standard deviation to increase power in identifying a discontinuity in $f(x)$ at x_n.

Our alternative hypothesis, H_1, conjectures a discontinuity in $f(x)$ at an a priori threshold T (i.e., zeros in the distributions of Δeps or forecast errors of earnings, or 1-penny in the distribution of eps). The distribution of τ_T is approximated by Student's t-distribution under H_0 if and only if the distribution of $\Delta p(x_i)$ is approximately normal in R_T. However, we do not rely on normality. Instead we compare the τ_T to other τ-values computed for nearby points. We examine the rank of τ_T relative to the other τ's as well as its relative magnitudes to assess if a discontinuity at T can be established. Fortunately, clear unambiguous results obtain: Using the full sample, the τ_T values always prove to be the largest when compared to the other τ values.[34]

Another test of a threshold-type discontinuity in a distribution is possible if there is a conditioning variable, z, that only shifts the location of the distribution of the variable of interest, x. Thus, for different values z_i, we need the locations (median or mean) of the associated x_i-distributions to vary across i while the other characteristics, such as the inter-quartile range (IQR), remain invariant. For the x's of interest to us, we are unable to identify a suitable z . For example, consider the case of calendar time (where we partition our 1974-95 period into 3-5 year intervals):

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[34] Given the ten neighborhood values to which we compare τ_T (see footnote 3 above), the likelihood of obtaining τ_T as the largest value by chance is slightly less than 10%. Looking at the magnitudes themselves, the neighborhood τ values interestingly compute to less than |2| while the τ_T values always exceed 2.

Conditioning variable (z) is calendar time		
x: variable of interest	Variation of Median(x) with z — desired high	Variation of $IQR(x)$ with z — desired low
EPS	High	High
ΔEPS	Low	Low
FERR	Low (not surprising)	Low

The table shows that partitioning x by calendar periods does not produce distributions that vary in location (median) but remain invariant in other characteristics (IQR).

The feasibility of price per share as a conditioning variable, z, is ruled out by the results shown in the main body of the paper in figure 4 — the patterns in figure 4 were seen to be similar to those in the table above.