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ScienceDirect
Journal of Accounting and Economics 42 (2006) 335–370
JOURNAL OF Accounting & Economics
www.elsevier.com/locate/jae

Earnings management through real activities manipulation ☆

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Abstract

I find evidence consistent with managers manipulating real activities to avoid reporting annual losses. Specifically, I find evidence suggesting price discounts to temporarily increase sales, overproduction to report lower cost of goods sold, and reduction of discretionary expenditures to improve reported margins. Cross-sectional analysis reveals that these activities are less prevalent in the presence of sophisticated investors. Other factors that influence real activities manipulation include industry membership, the stock of inventories and receivables, and incentives to meet zero earnings. There is also some, though less robust, evidence of real activities manipulation to meet annual analyst forecasts.

JEL classification: M4; M41; M43; M1

Keywords: Capital markets; Accounting choice; Earnings manipulation

☆This paper is based on my dissertation at the University of Rochester. I am grateful for the guidance I have received from my thesis advisor, Ross L. Watts and from my thesis committee members, Jerold Zimmerman and Andrew Leone. This paper has benefited from the comments of the editor, Doug Skinner (the editor), and Joseph Piotroski (the referee). I have also received helpful comments and suggestions from S.P. Kothari, Joanna Wu, Charles Wasley, Jim Brickley, Ludger Hentschel, Liz Demers, Shailendra Pandit, Joe Weber, and Hema Roychowdhury. I am grateful to the workshop participants at University of Michigan, Duke University, University of Pennsylvania, University of Chicago, University of Michigan, MIT, Harvard University, Columbia University, Northwestern University, Emory University and Yale University. All errors in the paper are mine.
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doi:10.1016/j.jacceco.2006.01.002

1. Introduction

There is substantial evidence that executives engage in earnings management.[1] One means of managing earnings is by manipulation of accruals with no direct cash flow consequences, hereafter referred to as accrual manipulation. Examples include under-provisioning for bad debt expenses and delaying asset write-offs. Managers also have incentives to manipulate real activities during the year to meet certain earnings targets. Real activities manipulation affects cash flows and in some cases, accruals. Much of the current research on earnings management focuses on detecting abnormal accruals. Studies that directly examine earnings management through real activities have concentrated mostly on investment activities, such as reductions in expenditures on research and development.[2]

My paper contributes to the literature on earnings management by presenting evidence on the management of *operational* activities, which has received little attention to date. Real activities manipulation is defined as management actions that deviate from normal business practices, undertaken with the primary objective of meeting certain earnings thresholds. The first objective of this paper is to develop empirical methods to detect real activities manipulation. I examine cash flow from operations (CFO), production costs, and discretionary expenses, variables that should capture the effect of real operations better than accruals. Next, I use these measures to detect real activities manipulation around the zero earnings threshold. I find evidence consistent with firms trying to avoid losses by offering price discounts to temporarily increase sales, engaging in overproduction to lower cost of goods sold (COGS), and reducing discretionary expenditures aggressively to improve margins.

There is predictable cross-sectional variation in real activities manipulation to avoid losses. In particular, the presence of sophisticated investors restricts the extent of real activities manipulation. This suggests that even though these activities enable managers to meet short-run earnings targets, they are unlikely to increase long-run firm value. Industry membership, the stock of inventories and receivables, growth opportunities, and the presence of debt are other factors that affect variation in real activities manipulation.

I develop several robustness tests to investigate if the evidence of abnormal real activities among firm-years reporting small annual profits reflect (a) earnings management to avoid losses, or (b) optimal responses to prevailing economic circumstances. The collective evidence from these robustness tests seems more consistent with the earnings management explanation. Finally, I document some evidence of real activities manipulation to meet/beat annual analyst forecasts.

Since Hayn (1995) and Burgstahler and Dichev (1997) found evidence of the discontinuity in frequency of firm-years around zero earnings, academics have had limited success in documenting further evidence of earnings management to avoid losses.[3] For example, Dechow et al. (2003) fail to find evidence that firms reporting small profits

[1]Healy (1985), Guidry et al. (1999). Defond and Jiambalvo (1994), Teoh et al. (1998a, b) and Kasznik (1999) are examples of studies that provide evidence on earnings management. Kothari (2001), Fields et al. (2001) and Healy and Wahlen (1999) provide a survey of the literature on earnings management and accrual manipulation.

[2]See Baber et al. (1991), Dechow and Sloan (1991), Bartov (1993), Bushee (1998), Bens et al. (2002) and Bens et al. (2003). These are discussed in greater detail in Section 2.2.

[3]The discontinuity in the distribution of firm-year frequency at zero earnings has since been corroborated by Degeorge et al. (1999), Burgstahler and Eames (1999), Dechow et al. (2003) and Beaver et al. (2003 and 2004).

manage accruals to cross the zero threshold. This paper contributes to the literature by providing evidence consistent with firms relying on real activities manipulation to meet the zero threshold. The evidence in this paper is particularly pertinent in the light of recent papers [Durtschi and Easton (2005), Beaver et al. (2004)] that question whether the observed discontinuities in firm-year distribution around zero can be attributed to earnings management.[4]

Section 2 discusses the definition of real activities manipulation and previous research. In Section 3, I identify firms that are likely to engage in real activities manipulation and develop hypotheses on how they should differ from the rest of the sample. I also develop hypotheses on cross-sectional variation in real activities manipulation. In Section 4, I discuss my data and estimation models, and present descriptive statistics. Section 5 presents my results. Section 6 discusses the implications of the evidence in this paper, as well as areas for further research.

2. Earnings management, real activities manipulation, and existing literature

2.1. Real activities manipulation

According to Healy and Wahlen (1999), "Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting practices." A number of studies discuss the possibility that managerial intervention in the reporting process can occur not only via accounting estimates and methods, but also through operational decisions. Healy and Wahlen (1999), Fudenberg and Tirole (1995), and Dechow and Skinner (2000) point to acceleration of sales, alterations in shipment schedules, and delaying of research and development (R&D) and maintenance expenditures as earnings management methods available to managers.

I define real activities manipulation as departures from normal operational practices, motivated by managers' desire to mislead at least some stakeholders into believing certain financial reporting goals have been met in the normal course of operations. These departures do not necessarily contribute to firm value even though they enable managers to meet reporting goals.[5] Certain real activities manipulation methods, such as price discounts and reduction of discretionary expenditures, are possibly optimal actions in certain economic circumstances. However, if managers engage in these activities more extensively than is normal given their economic circumstances, with the objective of meeting/beating an earnings target, they are engaging in real activities manipulation according to the definition in this paper.

Consistent with my definition, Graham et al.'s (2005) survey finds that (a) financial executives attach a high importance to meeting earnings targets such as zero earnings, previous period's earnings, and analyst forecasts, and (b) they are willing to manipulate

[4]Beaver et al. (2004) contend that the greater variance of loss items versus gain items in earnings, along with progressive taxation, is at least partially responsible for the discontinuity around zero. Durtschi and Easton (2005) argue that loss firms are valued differently from profit firms and this is responsible for the discontinuity in the frequency distribution of firm-years when they are partitioned on earnings scaled by price.

[5]Managers engage in these activities either because they perceive private benefits to meeting the reporting goals or because they are acting as agents in value-transfers amongst stakeholders. An example of the latter would be earnings management to avoid debt covenant violation or to avoid governmental intervention.

real activities to meet these targets, even though the manipulation potentially reduces firm value. Real activities manipulation can reduce firm value because actions taken in the current period to increase earnings can have a negative effect on cash flows in future periods. For example, aggressive price discounts to increase sales volumes and meet some short-term earnings target can lead customers to expect such discounts in future periods as well. This can imply lower margins on future sales. Overproduction generates excess inventories that have to be sold in subsequent periods and imposes greater inventory holding costs on the company.

Despite the costs associated with real activities manipulation, executives are unlikely to rely solely on accrual manipulation to manage earnings. Even though real activities manipulation potentially imposes greater long-term costs *on the company*, there are reasons to believe that managers expect to bear greater *private* costs, at least in the short term, when they engage in accrual manipulation. In the surveys conducted by Bruns and Merchant (1990) and Graham et al. (2005), financial executives indicate a greater willingness to manipulate earnings through real activities rather than accruals. There are at least two possible reasons for this. First, accrual manipulation is more likely to draw auditor or regulator scrutiny than real decisions about pricing and production.[6] Second, relying on accrual manipulation alone entails a risk. The realized year-end shortfall between unmanipulated earnings and the desired threshold can exceed the amount by which it is possible to manipulate accruals. If that happens, and reported income falls below the threshold, real activities cannot be manipulated at year-end.

2.2. Existing evidence on real activities manipulation

Most of the evidence on real activities management centers on the opportunistic reduction of R&D expenditures to reduce reported expenses. Bens et al. (2002, 2003) report that managers repurchase stock to avoid EPS dilution arising from (a) employee stock option exercises, and (b) employee stock option grants. Bens et al. (2002) find evidence that managers partially finance these repurchases by reducing R&D. Dechow and Sloan (1991) find that CEOs reduce spending on R&D toward the end of their tenure to increase short-term earnings. Baber et al. (1991) and Bushee (1998) also find evidence consistent with reduction of R&D expenditures to meet earnings benchmarks.

Anecdotal evidence suggests that managers engage in a range of activities in addition to reduction of R&D expenditures—for example, providing limited time discounts to increase sales toward the end of the year and building up excess inventory to lower reported COGS (overproduction). However, there is little systematic evidence on management of real activities other than R&D reduction. In Graham et al.'s (2005) survey, a larger number of respondents admit to reducing discretionary expenditures and/or capital investments than engaging in other manipulation methods. Bartov (1993) documents that firms with negative earnings changes report higher profits from asset sales. Thomas and Zhang (2002) report evidence consistent with overproduction but are unable to rule out adverse economic conditions as an alternative explanation for their results [see Hribar (2002)].

[6]Dechow Sloan and Sweeney (1996) investigate SEC enforcement actions alleging earnings overstatements. They do not list any action being initiated because of pricing or production decisions, or decisions on discretionary expenses. Although revenue recognition practices account for 40% of the SEC actions in their sample, it is unclear whether any of the actions were initiated because of allegations of channel-stuffing.

Burgstahler and Dichev (1997) provide some limited evidence on whether executives manage real activities to meet the zero earnings threshold. They plot the 25th, 50th, and 75th percentiles of unscaled CFO for each earnings interval and find that the distribution of CFO shifts upward in the first interval to the right of zero. However, this preliminary evidence does not conclusively indicate real activities manipulation nor does it yield any insights into the activities underlying the patterns in CFO. Burgstahler and Dichev (1997) do not test whether the shifts are statistically significant, nor do they impose controls for firm size/performance.

3. Hypotheses development

3.1. Main hypotheses

To detect real activities manipulation to avoid losses, I investigate patterns in CFO, discretionary expenses, and production costs for firms close to the zero earnings benchmark. CFO represents cash flow from operations as reported in the statement of cash flows. Discretionary expenses are defined as the sum of (a) advertising expenses, (b) R&D expenses, and (c) selling, general and administrative (SG&A) expenses.

Production costs are defined as the sum of COGS and change in inventory during the period. This definition generates "production" costs for non-manufacturing firms, although the terminology does not apply literally to such firms. Examining production costs instead of COGS has two advantages. First, accrual manipulation to lower reported COGS through the inventory account, for instance by delaying write-offs of obsolete inventory, should not affect production costs.[7] Consequently, production costs should primarily reflect the effects of real activities. Second, the LIFO/FIFO cost flow assumption affects reported COGS, but not production costs, due to offsetting effects on COGS and inventory change.[8]

I use the model in Dechow et al. (1998) to derive normal levels of CFO, discretionary expenses and productions costs for every firm-year.[9] Deviations from the normal levels are termed abnormal CFO, abnormal production costs, and abnormal discretionary expenses. I focus on the following three manipulation methods and their effects on the abnormal levels of the three variables:

1. Sales manipulation, that is, accelerating the timing of sales and/or generating additional unsustainable sales through increased price discounts or more lenient credit terms;
2. Reduction of discretionary expenditures; and
3. Overproduction, or increasing production to report lower COGS.

[7] To see this, note that production costs equals the sum of COGS and inventory change. Delaying write-offs of obsolete inventory reduces COGS but generates correspondingly higher ending inventory. The sum of COGS and inventory change is unaffected.

[8] To see this, let ΔLR be change in the LIFO reserve, and ΔINV be change in inventory and PROD be production costs during the year. $COGS_{FIFO} = COGS_{LIFO} - \Delta LR$. On the other hand, $\Delta INV_{FIFO} = \Delta INV_{LIFO} + \Delta LR$. This implies $PROD_{FIFO} = COGS_{FIFO} + \Delta INV_{FIFO} = COGS_{LIFO} - \Delta LR + \Delta INV_{LIFO} + \Delta LR = PROD_{LIFO}$. Thus, production costs are independent of the FIFO/LIFO choice. A related issue involves the use of LIFO liquidations to manage earnings. In this paper, I do not examine this possible real activity manipulation method. LIFO liquidations should lead to lower production costs than normal, and affect the power of my tests to detect overproduction and/or price discounts.

[9] Dechow et al. (1998) model is discussed in Appendix B.

Sales manipulation: I define sales manipulation as managers' attempts to temporarily increase sales during the year by offering price discounts or more lenient credit terms. One way managers can generate additional sales or accelerate sales from the next fiscal year into the current year is by offering 'limited-time' price discounts. The increased sales volumes as a result of the discounts are likely to disappear when the firm re-establishes the old prices. The cash inflow per sale, net of discounts, from these additional sales is lower as margins decline. Total earnings in the current period are higher as the additional sales are booked, assuming positive margins. The lower margins due to the price discounts cause production costs relative to sales to be abnormally high.

Another way to boost sales volumes temporarily to increase earnings is to offer more lenient credit terms. For example, retailers and automobile manufacturers often offer lower interest rates (zero-percent financing) toward the end of their fiscal years. These are essentially price discounts and lead to lower cash inflow over the life of the sales, as long as suppliers to the firm do not offer matching discounts on firm inputs. In general, I expect sales management activities to lead to lower current-period CFO and higher production costs than what is normal given the sales level.

Reduction of discretionary expenditures: Discretionary expenditures such as R&D, advertising, and maintenance are generally expensed in the same period that they are incurred. Hence firms can reduce reported expenses, and increase earnings, by reducing discretionary expenditures. This is most likely to occur when such expenditures do not generate immediate revenues and income. If managers reduce discretionary expenditures to meet earnings targets, they should exhibit unusually low discretionary expenses, where discretionary expenses are defined as the sum of R&D, advertising, and SG&A expenses. I consider SG&A because it often includes certain discretionary expenditures such as employee training, maintenance and travel, etc. If outlays on discretionary expenditures are generally in the form of cash, reducing such expenditures lowers cash outflows and has a positive effect on abnormal CFO in the current period, possibly at the risk of lower cash flows in the future.

Overproduction: To manage earnings upward, managers of manufacturing firms can produce more goods than necessary to meet expected demand. With higher production levels, fixed overhead costs are spread over a larger number of units, lowering fixed costs per unit. As long as the reduction in fixed costs per unit is not offset by any increase in marginal cost per unit, *total* cost per unit declines. This implies that reported COGS is lower, and the firm reports better operating margins. Nevertheless, the firm incurs production and holding costs on the over-produced items that are not recovered in the same period through sales.[10] As a result, cash flows from operations are lower than normal given sales levels. Ceteris paribus, the incremental marginal costs incurred in producing the additional inventories result in higher annual production costs relative to sales.

Two main points emerge from the preceding discussion in this section.

1. Excessive price discounts and overproduction lead to *abnormally high production costs* relative to dollar sales.[11] Reduction of discretionary expenditures leads to *abnormally low discretionary expenses* relative to sales.

[10]Presumably, managers engage in overproduction only if the reduction in reported product costs offsets the inventory holding costs that the firm has to recognize in the current period.

[11]This is another advantage of using production costs rather than COGS. Overproduction has a negative effect on COGS relative to sales, but price discounts have a positive effect, with an ambiguous net effect.

2. Price discounts, channel stuffing, and overproduction have a *negative* effect on contemporaneous abnormal CFO, while reduction of discretionary expenditures has a *positive* effect. Thus, the net effect on abnormal CFO is ambiguous.

For my primary tests, *suspect firm-years* are firm-years reporting small annual profits. My two main hypotheses, stated in alternate form, are the following:

H1A. *After controlling for sales levels, suspect firm-years exhibit at least one of the following: unusually low cash flow from operations (CFO) OR unusually low discretionary expenses.*

H2A. *After controlling for sales levels, suspect firm-years exhibit unusually high production costs.*

3.2. Cross-sectional variation in real activities manipulation

This section discusses four sources of cross-sectional variation in real activities manipulation among suspect firm-years: (a) industry membership; (b) incentives to meet zero earnings, including the presence of debt, growth opportunities, and short-term creditors; (c) earnings management flexibility, and (d) institutional ownership.

Industry membership: Overproduction and price discounts both generate abnormally high production costs relative to sales. Both manufacturing and non-manufacturing companies can offer price discounts to boost sales but overproduction as an earnings management strategy is only available to firms in manufacturing industries. Therefore, I expect the evidence of abnormal production costs to be driven to a greater extent by suspect firm-years that belong to manufacturing industries.[12]

H3A. *Ceteris paribus, suspect firm-years in manufacturing industries exhibit higher abnormal production costs than other suspect firm-years.*

Debt: In a preliminary investigation of why zero is an important earnings threshold, I consider the possibility that debt contracts include covenants that become tighter when firms incur losses. There is no systematic evidence on the prevalence of debt covenants that explicitly mention zero earnings, but debt contracts routinely have minimum tangible net worth requirements that are ratcheted upward every year the firm makes profits, but are not adjusted when the firm reports losses [see Dichev and Skinner (2002)].[13] At the very least, losses would make these covenants more binding.

It follows that suspect firm-years with debt covenants that make losses undesirable have a greater incentive to engage in real activities manipulation than suspect firm-years that do not have such covenants. Unfortunately, this is not a readily testable hypothesis, because data on actual debt covenants is not easily available for a wide sample. A commonly used measure, financial leverage, is unlikely to be a good proxy for the *existence* of net income

[12] This will be true if price discounting and overproduction by suspect manufacturing firms have a greater effect on production costs than price discounting by suspect non-manufacturing firms.

[13] For example, the credit agreement of Atlantic Plastics, specifies that the borrower shall not permit net worth for any given fiscal quarter to be less than the sum of 85% of the previous quarter's net worth *plus* 75% of consolidated net income *(but excluding net losses)* during the quarter.

covenants that make losses undesirable.[14] Therefore, I choose a more direct proxy, the existence of debt. I hypothesize that suspect firms-years with debt outstanding manipulate real activities more than those without.

H4A. *Ceteris paribus, suspect firm-years with debt outstanding exhibit abnormal production costs that are higher, and abnormal discretionary expenses that are lower than other suspect firm-years.*

Market-to-book: Skinner and Sloan (2002) document that firms with growth opportunities are penalized more by the stock market when they miss earnings thresholds. While their study focuses primarily on analyst forecasts, it is likely that growth firms also experience pressure to meet other earnings thresholds, including zero. Consistent with Skinner and Sloan (2002) and Hribar et al. (2004), my proxy for growth opportunities is the ratio of market value of equity to the book value of equity, or market-to-book.[15]

H5A. *Ceteris paribus, suspect firm-years with high market-to-book exhibit abnormal production costs that are higher than, and abnormal discretionary expenses that are lower than, other suspect firm-years.*

Short-term suppliers: A third possible reason for zero earnings being an important threshold (discussed by Graham et al. (2005) and Burgstahler and Dichev (1997)) is that there are stakeholders of the firm who use heuristic cut-offs at zero to evaluate its performance. Among the stakeholders whom these studies identify are suppliers, lenders, employees, and customers worried about future services. If the firm's earnings performance falls below a certain threshold, like zero, the firm's ability to pay suppliers in time and its potential as a future buyer are in doubt. This leads suppliers to tighten terms of credit and other terms. Managers are more likely to worry about the negative reaction of suppliers if they have more trade credit and other short-term liabilities outstanding. Therefore, the extent of real activities manipulation should vary positively with current liabilities at the beginning of the year.

H6A. *Ceteris paribus, suspect firm-years with high current liabilities as a percentage of total assets exhibit abnormal production costs that are higher than, and abnormal discretionary expenses that are lower than, other suspect firm-years.*

Earnings management flexibility: The extent of real activities manipulation should also vary with the flexibility managers have to undertake such activities. Excess production to absorb fixed costs in inventory is easier to accomplish and more likely to escape detection when a firm traditionally maintains a high stock of inventory. Similarly, a firm with substantial credit sales to dealers can more easily engage in channel stuffing, or accelerating the recognition of sales by shipping goods early to its dealers and booking receivables. The firm possibly has to offer additional price discounts to dealers to compensate them for any additional inventory holding costs. An already high stock of receivables likely generates an enhanced ability to accelerate sales and a lower probability

[14]Existing evidence suggests that leverage is not a particularly good proxy even for the tightness of covenants. Dichev and Skinner (2002) and Begley and Freedman (2004) do not find strong correlations between leverage and covenant slack, and question the use of leverage in the literature as a proxy for earnings management incentives.

[15]Another possible proxy, price/earnings (P/E) multiple is not used, because P/E multiples for firms with near-zero or negative earnings are difficult to interpret.

of detection by interested stakeholders and regulators. Thus, the stock of current assets, and in particular the stock of inventories and receivables, should be positively correlated with the ability of managers to engage in real activities manipulation, particularly those actions that lead to abnormally high production costs.[16]

H7A. *Ceteris paribus, suspect firm-years with a high level of inventories and receivables as a percentage of total assets exhibit abnormal production costs that are higher than other suspect firm-years.*

Institutional ownership: Institutional ownership can also affect the degree of earnings management. On the one hand, earning disappointments such as losses can possibly trigger institutional owners to engage in large-scale selling due to their focus on short-term earnings (myopic investment behavior). This implies that the presence of institutional shareholders exerts greater pressure on managers to avoid reporting losses. On the other hand, it is also possible that sophisticated institutional investors have a greater ability to analyze the long-term implications of current managerial actions. This would act as a *disincentive* for managers to engage in real activities manipulation, particularly if such manipulation reduces long-run firm value. Bushee (1998) examines firms trying to meet previous year's earnings and presents evidence consistent with the latter hypothesis. He finds that R&D reductions to avoid earnings decreases are more severe among firms with *lower* institutional ownership. Rajgopal et al. (1999) find a positive relation between earnings quality and institutional ownership. The results in these papers suggest that the presence of institutional investors should curtail real activities manipulation, particularly if such activities are harmful to firm value.

H8A. *Ceteris paribus, suspect firm-years with high institutional ownership exhibit abnormal production costs that are lower, and abnormal discretionary expenses that are higher than other suspect firm-years.*

In developing the above hypotheses, it is not possible to predict how abnormal CFO should vary with the presence of debt, market-to-book, current liabilities, earnings management flexibility and institutional ownership. This is because the variation in CFO with these variables depends on the net variation in abnormal CFO-decreasing activities (price discounts, overproduction) and abnormal CFO-increasing activities (discretionary expenditure reduction).

4. Data and methodology

4.1. Data

I sample all firms in COMPUSTAT between 1987 and 2001 with sufficient data available to calculate the COMPUSTAT-based variables in Appendix A for every firm-year. I require that cash flow from operations be available on COMPUSTAT from the Statement of Cash Flows. This restricts my sample to the post-1986 period.

[16] At extremely low levels of inventories and receivables, managers have limited flexibility to manage earnings through either accruals or real activities. It is possible that in such firms, managers are more aggressive in manipulating specific real activities that do not affect working capital accruals, for example, discounts on cash sales and reduction of cash discretionary expenditures. Roychowdhury (2004) investigates this possibility.

Given the primary focus on the zero target, I use annual data for my tests. Recall that the preliminary patterns in CFO detected by Burgstahler and Dichev (1997) are in annual data. Further, the zero target is probably more important at the annual level, since a number of firms are likely to report losses at the quarterly level due to seasonality in business. Annual losses, on the other hand, are likely to be viewed more seriously by the numerous stakeholders of firms, such as lenders and suppliers, particularly because they are audited and considered more reliable. Thus, managers are likely to have greater incentives to avoid reporting annual losses.

I eliminate firms in regulated industries (SIC codes between 4400 and 5000) and banks and financial institutions (SIC codes between 6000 and 6500). The models for normal or expected CFO, production costs, discretionary expenses, and accruals are estimated by every year and industry.[17] I require at least 15 observations for each industry-year grouping. Imposing all the data-availability requirements yields 21,758 firm-years over the period 1987–2001, including 36 industries and 4252 individual firms. This is the full sample that I use for testing H1A and H2A.

Data on institutional ownership is available from the Thomson Financial database on 13f filings. Requiring data on institutional ownership reduces the sample to 17,338 firm-years, with 3672 individual firms. I use this smaller sample for testing hypotheses on cross-sectional variation, H3A through H8A.

4.2. Estimation models

Following Dechow et al. (1998), hereafter DKW, I express normal cash flow from operations as a linear function of sales and change in sales in the current period (Eq. (3) in Appendix B). To estimate the model, I run the following cross-sectional regression for every industry and year:

$$\text{CFO}_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \varepsilon_t, \quad (1)$$

where A_t is the total assets at the end of period t, S_t the sales during period t and $\Delta S_t = S_t - S_{t-1}$.

For every firm-year, abnormal cash flow from operations is the actual CFO minus the "normal" CFO calculated using estimated coefficients from the corresponding industry-year model and the firm-year's sales and lagged assets.[18]

Expenses in DKW are expressed as a linear function of contemporaneous sales. Following DKW and allowing for intercepts, the model for normal COGS is estimated as

$$\text{COGS}_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta(S_t/A_{t-1}) + \varepsilon_t. \quad (2)$$

[17] The two-digit SIC code is used to identify an industry. None of my results are materially affected if I use Fama and French (1997) industry classifications instead of two-digit SIC codes.

[18] It is general convention in the literature to include a scaled intercept, $\alpha(1/A_{t-1})$, when estimating non-discretionary accruals. This avoids a spurious correlation between scaled CFO and scaled sales due to variation in the scaling variable, total assets. I also include an unscaled intercept, α_0, to ensure that the mean abnormal CFO for every industry-year is zero. Including the intercepts allows the average CFO_t/A_{t-1} for a particular industry-year to be non-zero even when the primary explanatory variables in the model, sales and change-in-sales, are zero. Eliminating the unscaled intercept does not materially affect the results, nor does retaining the unscaled intercept, but eliminating the scaled intercept $1/A_{t-1}$.

Similarly, following DKW, I estimate the model for 'normal' inventory growth using the following regression:

$$\Delta \mathrm{INV}_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(\Delta S_t/A_{t-1}) + \beta_2(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t, \tag{3}$$

where $\Delta \mathrm{INV}_t$ is the change in inventory in period t.

I define production costs as $\mathrm{PROD_t} = \mathrm{COGS_t} + \Delta \mathrm{INV}_t$. Using (2) and (3), I estimate normal production costs from the following industry-year regression.[19]

$$\mathrm{PROD}_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \beta_3(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t. \tag{4}$$

Under the simplifying assumptions in DKW, discretionary expenses should be also expressed as a linear function of contemporaneous sales, similar to COGS. The relevant regression would then be:

$$\mathrm{DISEXP}_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta(S_t/A_{t-1}) + \varepsilon_t,$$

where DISEXP_t is discretionary expenses in period t.

This creates the following problem: if firms manage sales upward to increase reported earnings in any year, they can exhibit unusually low residuals from the above regression in that year, even when they do not reduce discretionary expenses. To avoid this problem, discretionary expenses are expressed as a function of lagged sales. Therefore, to estimate normal discretionary expenses, I run the following regression for every industry and year:

$$\mathrm{DISEXP}_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta(S_{t-1}/A_{t-1}) + \varepsilon_t. \tag{5}$$

4.3. Selection of suspect firm-years

Fig. 1 groups firm-years into intervals based on net income scaled by total assets at the beginning of the year. The histogram of scaled earnings is constructed with widths of 0.005 for the range −0.075 to +0.075.[20] The histogram in Fig. 1 is similar to that documented by prior literature, with the prominent upward shift in the frequency of firm-years going from the left of zero to the right. Researchers have argued that it is likely that firm-years in the interval just right of zero manage their earnings to report income marginally above zero. Since earnings are scaled by total assets, the discontinuity at zero cannot be explained by Durtschi and Easton (2005), who argue that scaling by market capitalization generates the discontinuity.

To increase the power of my tests to detect real activities manipulation, I concentrate on firm-years in the interval to the immediate right of zero, the *suspect firm-years*. Suspect firm-years have net income scaled by total assets that is greater than or equal to zero but less than 0.005 (interval 16 in the figure). There are 503 suspect firm-years, including 450 unique firms.

[19]Augmenting the models for normal inventory change and normal production costs by a term that captures the change in sales next period has no material effect on the results reported.

[20]The histogram is truncated at the extremes, meaning that I exclude firm-years with scaled earnings above 0.075 or below −0.075. This is true for both figures presented in this paper. In the case of firm-years grouped by scaled earnings, the intervals presented in the figures include 10,958 firm-years, or just over 50% of my total sample.

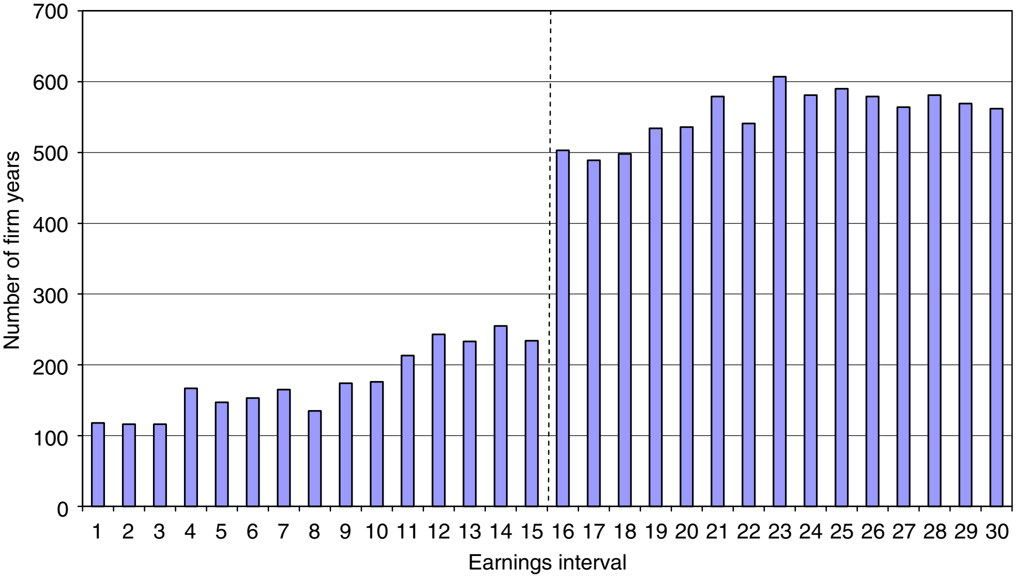

Fig. 1. Number of firm years by earnings interval: 21,758 firm-years over the period 1987–2001 are classified into earnings intervals over the range −0.075 to +0.075, where earnings is defined as income before extraordinary items (IBEI) scaled by total assets (A). Each interval is of width 0.005, with category 16 including firm-years with earnings greater than or equal to zero and less than 0.005. The figure is truncated at the two ends and includes 10,958 firm-years.

Concentrating on these suspect firm-years presents two potential problems. First, managers have to pre-commit to real activities manipulation before the end of the fiscal year. Firms that just meet zero earnings are probably not the only ones that try to meet the zero target through real activities manipulation. Focusing on only firm-years in the small interval (interval 16) to the right of zero restricts the power of my tests. Second, firms whose 'unmanipulated' earnings are substantially above zero possibly have an incentive to manage earnings downward to report profits that are only slightly above zero, in order to create reserves for the future. In that case, the interval just right of zero possibly includes firm-years with downward earnings management. This lowers the proportion of firms in the suspect interval that manage earnings upward to meet the zero target and hence, lowers the power of my tests. However, I do not include other intervals in the suspect category, as these intervals are likely to contain a higher proportion of firm-years that did not manipulate earnings at all.

4.4. Descriptive statistics

4.4.1. Firm characteristics

Table 1 presents descriptive statistics comparing the suspect firm-years to the full sample. The mean market capitalization of suspect firm-years, at around $746 million, is almost half that of the mean for the full sample, $1.4 billion. Interestingly, mean total assets ($1.2 billion) of the suspect firm-years are not smaller than the full sample mean

Table 1
Descriptive statistics

	Suspect firm-years		Rest of the sample		Difference in	
	Mean	Median	Mean	Median	Means (*t*-stat)	Medians (*z*-stat)
Full sample of 21,758 firm-years with 503 suspect firm-years						
MVE ($ million)	745.82	75.60	1414.43	137.34	−668.61**	−61.74**
					(−5.84)	(−5.33)
MVE/BVE	1.60	1.21	2.75	1.93	−1.15**	−0.72**
					(−10.64)	(−9.68)
Total assets ($ million)	1180.57	153.17	1124.17	164.54	56.04	−11.37
					(0.34)	(−0.61)
Sales ($ million)	1254.14	214.88	1394.35	221.05	−140.21	−6.17
					(−0.88)	(−0.14)
IBEI ($ million)	2.81	0.29	61.80	4.46	−58.99**	−4.47**
					(−36.29)	(−16.27)
CFO ($ million)	81.06	5.15	126.55	10.76	−45.49**	−5.61**
					(−3.45)	(−3.80)
Accruals ($ million)	−78.24	−4.86	−64.67	−5.41	−13.57	0.55
					(−1.07)	(0.62)
Sales/A	1.39	1.25	1.48	1.30	−0.09*	−0.05
					(−1.92)	(−1.62)
IBEI/A (%)	0.24	0.22	0.31	4.09	−0.07	−3.87**
					(−0.53)	(−22.09)
CFO/A (%)	4.54	4.77	6.50	8.25	−1.96**	−3.48**
					(−5.11)	(−7.60)
Accruals/A (%)	−4.31	−4.54	−6.16	−5.20	1.85**	0.66
					(4.99)	(1.44)
Production costs/A (%)	98.99	80.45	97.08	78.79	1.91	1.66
					(0.08)	(0.60)
Discretionary expenses/A (%)	36.63	30.31	44.16	37.44	−7.53**	−7.13**
					(−6.41)	(−3.94)
Inventory turnover ratio	10.75	4.29	12.80	4.55	−2.05*	−0.26*
					(−1.88)	(−1.94)
Receivables turnover ratio	19.55	6.00	17.40	6.10	2.15	−0.10
					(0.64)	(0.41)
Sub-sample of 17,338 firm-years, including 389 suspect firm-years						
Institutional ownership	31.11	26.87	35.32	33.26	−4.32**	−6.39**
					(−3.56)	(−3.15)

*Significant at the 1% level. **Significant at the 5% level.
The sample period spans 1987–2001. Suspect firm-years are firm-years with reported income before extraordinary items between 0% and 0.5% of total assets. The numbers in parentheses are *t*-statistics from *t*-tests for the differences in means, and *z*-statistics from Wilcoxon tests for the differences in medians. All descriptive statistics except for institutional ownership are reported for the full sample of 21,758 firm-years. Data on institutional ownership is available for a sub-sample of 17,338 firm-years. Please see Appendix A for variable descriptions.

($1.1 billion), so that suspect firm-years have significantly lower mean ratio of market value of equity to book value of equity than the overall sample (1.60 versus 2.75).

Scaling CFO by total assets is similar to measuring CFO relative to sales, as total assets and sales are very highly correlated, with a correlation coefficient of 91%. Consistent with my first hypothesis, suspect firm-years have a lower mean CFO as a percentage of assets:

mean scaled CFO is 4.5% for suspect firm-years, versus 6.5% for the whole sample. The mean-scaled discretionary expenses of the suspect firms (37% of total assets) are significantly lower than the mean for the full sample (44%). Mean production costs scaled by total assets are similar for suspect firm-years and the full sample (99% and 97%, respectively), and not significantly different. Mean inventory turnover ratio is significantly lower for suspect firm-years at the 10% level, consistent with suspect firm-years lowering reported COGS by overproduction. Finally, mean institutional ownership for the entire sample of firms with institutional data available is 35%. Mean institutional ownership for suspect firm-years is lower by around 4%, a statistically significant difference.

4.4.2. Estimation models

Table 2 reports the regression coefficients for some of the key regressions used to estimate "normal" levels (see Section 4.2). I estimate these models using the entire sample of 21,758 firm-years. The table reports the mean coefficients across industry-years and t-statistics from standard errors across industry-years. For the sake of comparison, I also present coefficients from the cross-sectional Jones model for normal accruals.[21]

The coefficients are generally as predicted by DKW, with one exception. Under the simplifying assumptions of DKW, the coefficient of scaled CFO on $\Delta S_t/A_{t-1}$ should be negative and of a similar magnitude as the coefficient of scaled accruals on $\Delta S_t/A_{t-1}$ (0.0490). That is, in their model, any dependence of accruals on sales change has to be offset by a reverse dependence of CFO on sales change. This is because DKW assume net income is completely determined by contemporaneous revenues and is independent of revenues in the previous period, an assumption that is not likely to be descriptive of real data. The coefficient of CFO on sales change is actually positive (0.0173) and marginally significant, indicating that conditional on contemporaneous sales, a higher change in sales implies higher CFO. The explanatory power of the models is quite high. The average adjusted R^2s across industry-years is 45% for CFO, 89% for production costs, and 38% for discretionary expenses. The mean adjusted R^2 in the regressions for accruals is provided for comparison, and is equal to 28%.

4.4.3. Univariate correlations

Table 3 presents correlations between various variables. Consistent with prior studies, accruals and CFO as a percentage of total assets exhibit a strong negative correlation, with a correlation coefficient of −17%. Income before extraordinary items (hereafter referred to as net income) is correlated positively with both CFO (71%) and accruals (57%). The correlations between the total and abnormal levels of various variables are usually positive. The correlation coefficient between abnormal production costs and abnormal discretionary expenses is strongly negative (−63%). This is probably because managers engage in activities leading to abnormally high production costs at the same time that they reduce discretionary expenses, the common goal being to report higher earnings. The correlation between abnormal accruals and abnormal CFO is also negative (−22%). This is probably because (a) managers engage in accrual manipulation and real activities manipulation at the same time, and (b) some manipulation methods, for example overproduction, have a positive effect on abnormal accruals and a negative effect on abnormal CFO.

[21] See DeFond and Jiambalvo (1994).

Table 2
Model parameters

	CFO_t/A_{t-1}	$DISEXP_t/A_{t-1}$	$PROD_t/A_{t-1}$	$Accruals_t/A_{t-1}$
Intercept	0.0308**	0.1524**	−0.1715**	−0.0311**
	(6.59)	(9.64)	(−9.40)	(−4.72)
$1/A_{t-1}$	−1.1745**	2.7480**	−0.6969**	−0.3269**
	(−9.73)	(8.97)	(−2.47)	(−1.99)
S_t/A_{t-1}	0.0516**		0.7874**	
	(12.83)		(108.99)	
S_t/A_{t-1}		0.1596**		
		(18.17)		
$\Delta S_t/A_{t-1}$	0.0173*		0.0404**	0.0490**
	(1.96)		(2.35)	(5.65)
$\Delta S_{t-1}/A_{t-1}$			−0.0147*	
			(−1.79)	
PPE_{t-1}/A_{t-1}				−0.0600**
				(−3.96)
Adjusted R^2	0.45	0.38	0.89	0.28

*Significant at the 10% level. **Significant at the 5% level.
This table reports the estimated parameters in the following regressions:

(a) $CFO_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \varepsilon_t$
(b) $DISEXP_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta(S_t/A_{t-1}) + \varepsilon_t$
(c) $PROD_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \beta_3(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t$
(d) $Accruals_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(\Delta S_t/A_{t-1}) + \beta_2(PPE_{t-1}/A_{t-1}) + \varepsilon_t$

The regressions are estimated for every industry every year. Two-digit SIC codes are used to define industries. Industry-years with fewer than 15 firms are eliminated from the sample. There are 416 separate industry-years over 1987–2001. The table reports the mean coefficient across all industry-years and t-statistics calculated using the standard error of the mean across industry-years. The table also reports the mean R^2s (across industry-years) for each of these regressions. Please see Appendix A for variable descriptions.

5. Results

5.1. Comparison of suspect firm-years with the rest of the sample

If firm-years that report profits just above zero undertake activities that adversely affect their CFO, then the abnormal CFO for these firm-years, calculated using the industry-year model described in Section 4.2, should be negative compared to the rest of the sample. To test this, I estimate the following regression:

$$Y_t = \alpha + \beta_1(\text{SIZE})_{t-1} + \beta_2(\text{MTB})_{t-1} + \beta_3(\text{Net income})t + \beta_4(\text{SUSPECT\_NI})_t + \varepsilon_t. \quad (6)$$

In this case, the dependent variable, Y_t, is abnormal CFO in period t. Regression (6) is also estimated with abnormal production costs and abnormal discretionary expenses as the dependent variables. SUSPECT_NI is an indicator variable that is set equal to one if firm-years belong to the earnings category just right of zero, and zero otherwise.

To control for systematic variation in abnormal CFO, production costs and discretionary expenses with growth opportunities and size, the regression includes two

Table 3
Correlation table

	Sales/*A*	IBEI/*A*	CFO/*A*	Accruals/*A*	PROD/*A*	DISEXP/*A*	Abnormal CFO	Abnormal PROD	Abnormal DISEXP
IBEI/*A*	0.22								
CFO/*A*	0.11	0.71							
Accruals/*A*	0.18	0.57	−0.17						
PROD/*A*	0.95	0.13	0.01	0.17					
DISEXP/*A*	0.39	−0.16	−0.18	−0.01	0.15				
Abnormal CFO	−0.01	0.46	0.74	−0.22	−0.10	−0.10			
Abnormal PROD	−0.02	−0.22	−0.28	0.02	0.22	−0.48	−0.35		
Abnormal DISEXP	0.11	−0.08	−0.06	−0.04	−0.06	0.66	−0.17	−0.63	
Abnormal accruals	0.04	0.42	−0.18	0.81	0.04	−0.05	−0.22	0.03	−0.11

This table reports pooled Pearson correlations for the entire sample of 21,758 firm-years over the period 1987–2001. Correlations significant at the 5% level are marked in bold. Please see Appendix A for variable descriptions.

control variables: MTB and SIZE. MTB, or the market-to-book ratio, is the ratio of market value of equity to book value of equity. SIZE is the logarithm of the market value of equity at the beginning of the year. Dechow et al. (1995, 1996) argue that abnormal accruals calculated using conventional, non-discretionary-accruals models have measurement error positively correlated with firm performance. To address the possibility that abnormal values from my estimation models have measurement error correlated with performance, I include net income as a control variable in the regressions.[22] The net income figure is scaled by lagged total assets, so it is similar to return-on-assets (ROA).[23] Since the dependent variables are essentially deviations from 'normal' levels within an industry-year, all the control variables in the regressions are also expressed as deviations from the respective industry-year means.

The coefficients of regression (6) are estimated in the cross-section every year. Table 4 reports the time-series means of the coefficients from the 15 annual cross-sectional regressions over the period 1987–2001, along with the corresponding *t*-statistics (Fama and MacBeth, 1973). The number of cross-sectional observations ranges from around one thousand firms in 1987 to around 2000 firms every year in the late 1990s.

The first two columns in Table 4 provide evidence on H1A—*both* abnormal CFO and abnormal discretionary expenses are unusually low for suspect firm-years. When the dependent variable in regression (6) is abnormal CFO, the coefficient on SUSPECT_NI is negative (−0.0200) and significant at the 5% level ($t = -3.05$). Suspect firm-years have abnormal CFO that is lower on average by 2% of assets compared to the rest of the sample. This difference is economically large, given that the median CFO across all

[22]As Guay et al. (1996) point out, managers' incentives to manipulate earnings are probably correlated with firm performance and this can lead to the observed correlations. If this is true, controlling for performance restricts the power of my tests.

[23]Instead of current year's income, if I include net income lagged by one year, or the average performance over the most recent 3 years, the empirical results are practically unchanged.

Table 4
Comparison of suspect firm-years with the rest of the sample

	Abnormal CFO	Abnormal discretionary expenses	Abnormal production costs
Intercept	0.0026**	0.0464**	−0.0021**
	(7.40)	(11.94)	(−2.51)
SIZE	0.0001	0.0237**	−0.0041**
	(0.56)	(7.34)	(−3.96)
MTB	0.0010**	0.0033**	−0.0039**
	(3.11)	(2.00)	(−6.36)
Net income	0.1904**	−0.1721**	−0.1118**
	(7.21)	(−4.65)	(−6.02)
SUSPECT_NI	−0.0200**	−0.0591**	0.0497**
	(−3.05)	(−4.35)	(4.99)

*Significant at the 10% level. ** Significant at the 5% level.
This table reports the results of Fama-Macbeth regressions, over a period of fifteen years from 1987 to 2001. The total sample includes 21,758 observations. The regressions being estimated are of the form

$$Y_t = \alpha + \beta_1(\text{SIZE})_{t-1} + \beta_2(\text{MTB})_{t-1} + \beta_3(\text{Net income})_t + \beta_4(\text{SUSPECT\_NI})_t + \varepsilon_t.$$

Each column presents the results of the above regression for a different dependent variable, whose name appears at the top of the respective column. *T*-statistics are calculated using standard errors corrected for autocorrelation using the Newey–West procedure. They are reported in parentheses. Please see Appendix A for variable descriptions.

firm-years is 8% of total assets at the beginning of the year (see Table 1). When Y_t is set equal to abnormal discretionary expenses in regression (6), the coefficient on SUSPECT_NI is negative (−0.0591) and significant at the 5% level ($t = -4.35$). Suspect firm-years have abnormal discretionary expenses that are lower on average by 5.91% of assets compared to the rest of the sample. This seems economicallysignificant, with median discretionary expenses across all firm-years at 37% of total assets at the beginning of the year (see Table 1).[24]

To test H2A, I re-estimate regression (6) setting Y_t equal to abnormal production costs in period t. The results of this regression (the third column of results in Table 4) indicate that firm-years just right of zero have unusually high production costs as a percentage of sales levels. The coefficient on SUSPECT_NI is positive (0.0497) and significant at the 5% level ($t = 4.99$). The coefficient indicates that the mean abnormal production costs of suspect firm-years are larger by 4.97% of assets than the mean across the rest of the sample. This is an economically significant amount, given that median production costs as a percentage of total assets for the entire sample is around 79% (Table 1).

[24]I also check whether mean abnormal R&D expenses are unusually low for suspect firm-years. Abnormal R&D expense for a particular firm-year is the residual from the corresponding industry-year regression: $R\&D_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta(S_{t-1}/A_{t-1}) + \varepsilon_t$. With Y_t set equal to abnormal R&D in regression (6), the coefficient on SUSPECT_NI is negative (−0.0082), though the statistical significance is not as high ($t = -1.93$) as for abnormal discretionary expenses.

In untabulated tests, I also find evidence of abnormally high inventory growth for suspect firm-years. A regression of abnormal inventory change on SIZE, MTB, net income, and SUSPECT_NI yields a significantly positive coefficient on SUSPECT_NI (0.0112, $t = 4.39$). This is consistent with overproduction. However, I fail to detect abnormally high growth in gross accounts receivables.[25]

5.2. *Comparison of suspect interval with other earnings intervals in the vicinity of the zero benchmark*

This section examines whether the observed patterns in abnormal production costs, CFO, and discretionary expenses are more consistent with earnings management or rational responses to economic circumstances. I define residual production costs for a particular firm-year as the residual from the following annual cross-sectional regression:

$$\text{Abnormal PROD}_t = \alpha + \beta_1(\text{SIZE})_{t-1} + \beta_2(\text{MTB})_{t-1} + \beta_3(\text{Net income})_t + \varepsilon_t.$$

Residual values of other variables, like CFO and discretionary expenses, are defined similarly, in order to control for size, market-to-book, and net income.

Fig. 2 charts residual production costs for each earnings interval between −0.075 and +0.075. Recall that these intervals contain 10,958 firm-years, around 50% of the full sample. For a large number of intervals in the figure, the average residual production costs are positive. The average residual production costs for the suspect firm-years are sharply higher compared to all other intervals reported. Earnings management to avoid the zero threshold explains this pattern well, because the interval to the immediate right of zero is most likely to contain a high proportion of firm-years that have managed earnings upward. The pattern is less consistent with an alternate explanation that attributes the abnormal production costs of suspect firm-years to economic circumstances. Such an explanation would require that suspect firm-years face unusually adverse economic conditions, even when compared to firm-years that experience worse performance. While this is possible, it is difficult to identify these special circumstances ex ante.

Fig. 3 presents a similar pattern for residual CFO. The mean residual CFO for the suspect interval is more negative than any other interval presented in the graph. Fig. 4 reveals that the pattern in residual discretionary expenses is similar to that in abnormal CFO. Mean residual discretionary expenses are negative for the suspect interval, more so than all other intervals in the figure, with the exception of one interval to the left of zero.

To test the statistical significance of the patterns in Figs. 2–4, I estimate regression (6) for various dependent variables using only the 10,958 firm-years represented in the figures. The results are provided in Table 5. Thus, in Table 5, firm-years in the suspect interval are compared to firm-years in other intervals with scaled earnings between plus and minus 7.5% of zero. This has the advantage that mean production costs, CFO, etc., of the comparison group are less driven by firm-years with extreme performance.[26]

[25]To estimate normal growth in gross receivables, I run the following regression for every industry and year: $\Delta AR_t/A_{t-1} = \alpha(1/A_{t-1}) + \beta(\Delta S_t/A_{t-1}) + \varepsilon_t$, where AR is gross accounts receivables. It is possible that managers engage in activities that increase credit sales, but the increased receivables outstanding are factored away. This is probably one reason for the lack of evidence on receivables growth.

[26]A disadvantage of using this comparison group is that it contains a higher proportion of firm-years that are likely to have managed real activities to meet the zero threshold. Comparing against this group results in tests of lower power.

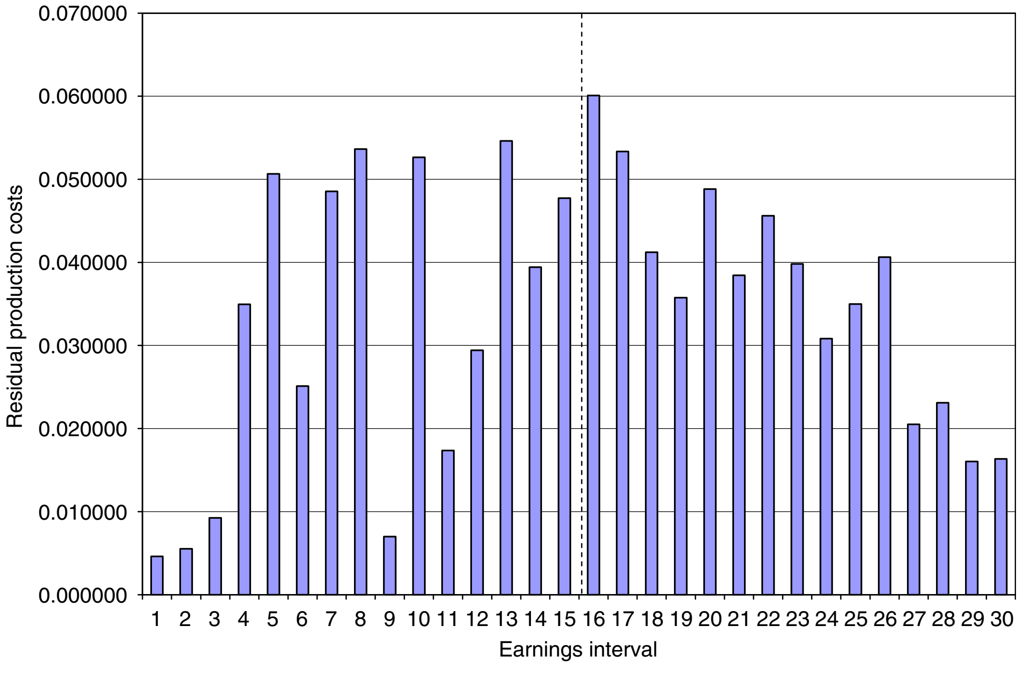

Fig. 2. Residual production cost by earnings interval. 21,758 firm-years over the period 1987–2001 are classified into earnings intervals over the range −0.075 to +0.075, where earnings is defined as income before extraordinary items (IBEI) scaled by total assets (A). Each interval is of width 0.005, with category 16 including firm-years with earnings greater than or equal to zero and less than 0.005. The figure is truncated at the two ends and includes 10,958 firm-years. Residual production costs for a particular firm-year is the residual from the following annual cross-sectional regression:

$$\text{Abnormal PROD}_t = \alpha + \beta_1(\text{SIZE})_{t-1} + \beta_2(\text{MTB})_{t-1} + \beta_3(\text{Net income})_t + \varepsilon_t.$$

Please see Appendix A for other variable descriptions.

The first two columns in Table 5 provide evidence on H1A. The coefficient on SUSPECT_NI is negative (−0.0169) and statistically significant ($t = -3.73$) with abnormal CFO as the dependent variables. Thus, the suspect interval has a mean abnormal CFO that is significantly more negative than the mean across all other intervals in Fig. 4. Additional analysis (results untabulated) shows this is true of only one other interval in Fig. 4—the second interval to the right of zero. The coefficient on SUSPECT_NI is also significantly negative (−0.0178, $t = -2.21$) with abnormal discretionary expenses as the dependent variable. Thus, the suspect interval has mean abnormal discretionary expenses significantly more negative than the mean across all other intervals in Fig. 3. Untabulated results show this is true of only two other intervals in Fig. 3, intervals 10 and 14.

The third column of Table 5 provides evidence on H2A. The coefficient on SUSPECT_NI is positive (0.0275) and statistically significant ($t = 2.94$) with abnormal production costs as the dependent variable. This implies that the suspect interval has mean abnormal production costs significantly higher than the mean across all other intervals in Fig. 2. This is not true for *any* other earnings interval in Fig. 2.

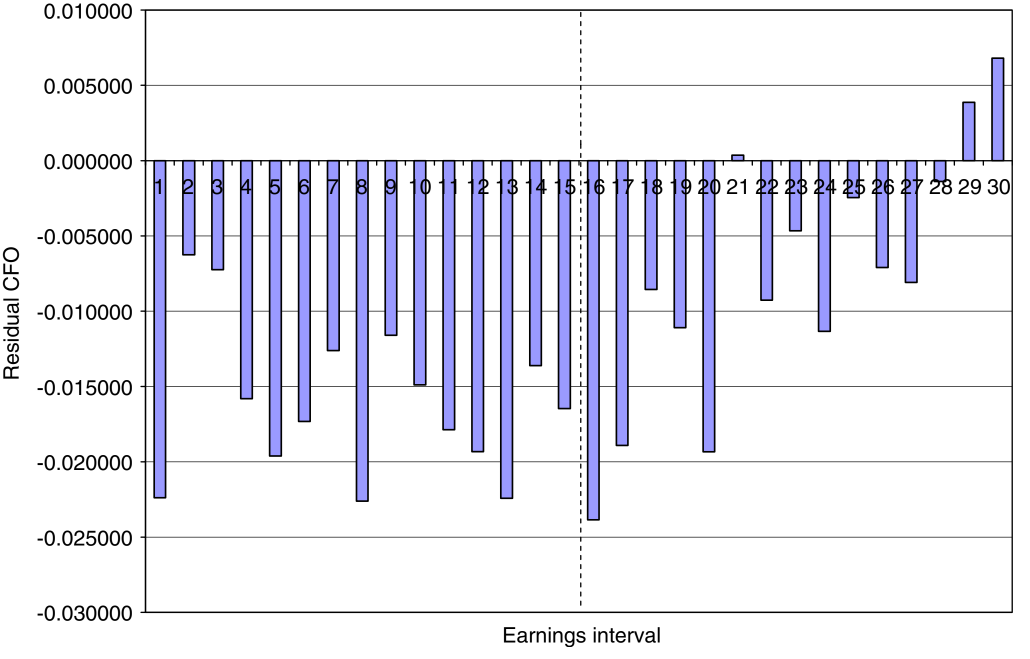

Fig. 3. Residual CFO by earnings interval: 21,758 firm-years over the period 1987–2001 are classified into earnings intervals over the range −0.075 to +0.075, where earnings is defined as income before extraordinary items (IBEI) scaled by total assets (A). Each interval is of width 0.005, with category 16 including firm-years with earnings greater than or equal to zero and less than 0.005. The figure is truncated at the two ends and includes 10,958 firm-years. Residual CFO for a particular firm-year is the residual from the following annual cross-sectional regression:

$$\text{Abnormal CFO}_t = \alpha + \beta_1(\text{SIZE})_{t-1} + \beta_2(\text{MTB})_{t-1} + \beta_3(\text{Net income})_t + \varepsilon_t.$$

Please see Appendix A for other variable descriptions.

In summary, the evidence of unusually low CFO and discretionary expenses, and unusually high production costs exhibited by suspect firm-years is robust to alternate comparison groups. The results seem more consistent with earnings management than with a failure to adequately control for economic circumstances.[27]

5.3. Results on cross-sectional variation in real activities manipulation

I use the following variables to proxy for the sources of cross-sectional variation in incentives for real activities manipulation are: (a) MFG, (b) HASDEBT, (d) MTB_RANK, (c) CL_RANK, (e) INVREC_RANK, (f) INST_RANK, and finally, (g) SIZE_RANK.

[27]In additional robustness tests, I identify suspect firm-years based (a) pre-tax earnings instead of post-tax earnings and (b) unscaled earnings per share, instead of earnings scaled by total assets. The evidence of real activities manipulation to avoid losses is robust to these alternate methods of identifying suspect firm-years.

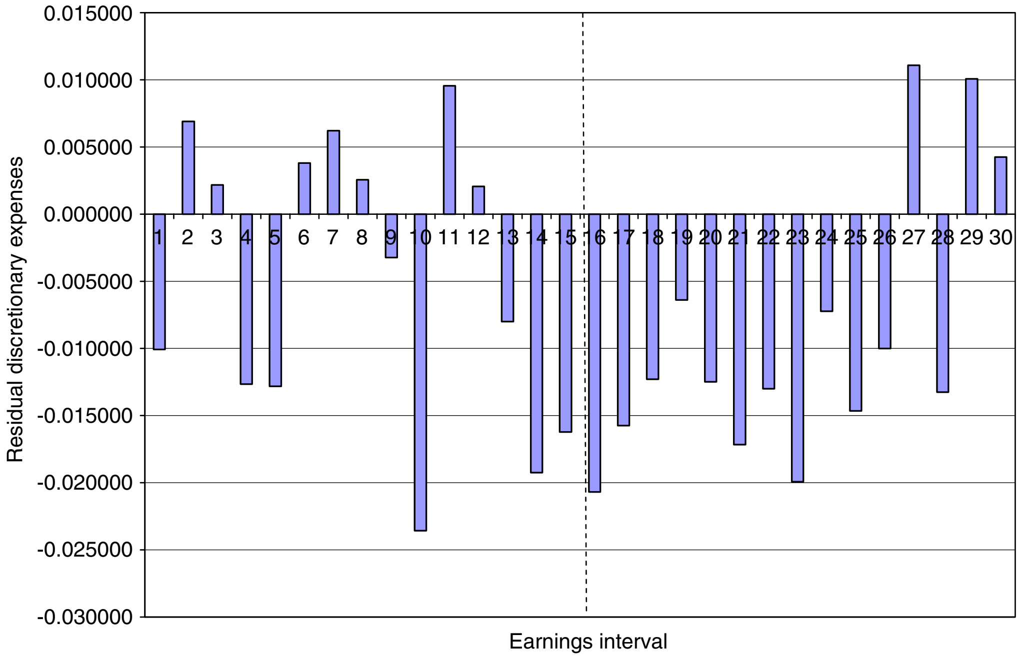

Fig. 4. Residual discretionary expenses by earnings interval: 21,758 firm-years over the period 1987–2001 are classified into earnings intervals over the range -0.075 to $+0.075$, where earnings is defined as income before extraordinary items (IBEI) scaled by total assets (A). Each interval is of width 0.005, with category 16 including firm-years with earnings greater than or equal to zero and less than 0.005. The figure is truncated at the two ends and includes 10,958 firm-years. Residual discretionary expenses for a particular firm-year is the residual from the following annual cross-sectional regression:

$$\text{Abnormal DISEXP}_t = \alpha + \beta_1(\text{SIZE})_{t-1} + \beta_2(\text{MTB})_{t-1} + \beta_3(\text{Net income})_t + \varepsilon_t.$$

Please see Appendix A for other variable descriptions.

MFG and HASDEBT are zero/one indicator variables. MFG is set equal to one if a particular firm belongs to a manufacturing industry, and is set equal to zero otherwise.[28] HASDEBT is set equal to one if the firm has any long-term or short-term debt outstanding on its balance sheet at the beginning or at the end of the year; otherwise it is set equal to zero. Out of the 17,338 firm-years, 12,889 firm-years have no debt outstanding.

The remaining variables are binary rank variables. To define the rank variables, I first define continuous variables that are expressed as deviations from their respective industry-year means. CL is beginning-of-year industry-year-adjusted current liabilities excluding short-term debt, as a percentage of total assets. INVREC is the sum of beginning-of-year industry-year-adjusted inventories and receivables as a percentage of total assets. INST is beginning-of-year industry-year-adjusted percentage of outstanding shares owned by institutional investors. MTB and SIZE represent industry-year adjusted market-to-book

[28] I use the classification by the US Department of Labor to identify manufacturing industries. Industries represented by two-digit SIC codes between 20 and 39 are classified as manufacturing (18 out of the total 36 industries in my sample).

Table 5
Comparison of suspect firm-years with firms in the vicinity of zero earnings

	Abnormal CFO	Abnormal discretionary expenses	Abnormal production costs
Intercept	−0.0092**	0.0032	−0.0001
	(−7.81)	(0.59)	(−0.59)
SIZE	−0.0022**	0.0195**	0.0034**
	(2.49)	(8.12)	(3.69)
MTB	0.0003	0.0042**	−0.0037**
	(0.74)	(4.83)	(−3.36)
Net income	0.2203**	−0.1811*	−0.1074**
	(7.39)	(−1.92)	(−3.62)
SUSPECT_NI	−0.0169**	−0.0178**	0.0275**
	(−3.73)	(−2.21)	(2.94)

* Significant at the 10% level. ** Significant at the 5% level.
This table reports the results of Fama–Macbeth regressions, over a period of fifteen years from 1987 to 2001. The total sample includes 10,958 observations. The regressions being estimated are of the form

$$Y_t = \alpha + \beta_1(\text{SIZE})_{t-1} + \beta_2(\text{MTB})_{t-1} + \beta_3(\text{Net income})_t + \beta_4(\text{SUSPECT\_NI})_t + \varepsilon_t.$$

Each column presents the results of the above regression for a different dependent variable, whose name appears at the top of the respective column. T-statistics are calculated using standard errors corrected for autocorrelation using the Newey–West procedure. They are reported in parentheses. Please see Appendix A for variable descriptions.

ratio and logarithm of market value of equity, as defined earlier. I include SIZE primarily as a control variable, since it is correlated with many of the explanatory variables of interest.

The rank variables assume the value of one if the corresponding industry-year adjusted variable is above the median for the corresponding year, and zero otherwise. For example, INST_RANK for a particular firm in year 1995 is one if that firm's INST is above the median INST for year 1995, and zero otherwise. CL_RANK, MTB_RANK, INVREC_RANK, INST_RANK and SIZE_RANK are defined similarly.

Table 6 presents the Pearson correlation coefficients between the various hypothesized determinants of cross-sectional variation. Panel A of Table 6 presents the correlations between the two indicator variables and the remaining industry-year adjusted continuous variables. In Panel B, I replace the continuous variables with the corresponding binary rank variables. To test H3A–H6A, I estimate the following regression using the Fama–Macbeth procedure:

$$\begin{aligned} Y_t = \alpha &+ \beta_1(\text{Net income})_t + \beta 2(\text{SUSPECT\_NI})_t + \beta_3(\text{MFG})_t + \beta_4(\text{HASDEBT})_{t-1} \\ &+ \beta_5(\text{MTB\_RANK})_{t-1} + \beta_6(\text{CL\_RANK})_t + \beta_7(\text{INVREC\_RANK})_{t-1} \\ &+ \beta_8(\text{INST\_RANK})_t + \beta_9(\text{SIZE\_RANK})_{t-1} + \beta_{10}(\text{MFG})_t(\text{SUSPECT\_NI})_t \\ &+ \beta_{11}(\text{HASDEBT})_t(\text{SUSPECT\_NI})_t + \beta_{12}(\text{MTB\_RANK})_{t-1}(\text{SUSPECT\_NI})_t \\ &+ \beta_{13}(\text{CL\_RANK})_t(\text{SUSPECT\_NI})_t + \beta_{14}(\text{INVREC\_RANK})_{t-1}(\text{SUSPECT\_NI})_t \\ &+ \beta_{15}(\text{INST\_RANK})_t(\text{SUSPECT\_NI})_t + \beta_{16}(\text{SIZE\_RANK})_{t-1}(\text{SUSPECT\_NI})_t + \varepsilon_t, \end{aligned} \quad (7)$$

Table 6
Correlation among hypothesized determinants of cross-sectional variation

	MFG	HASDEBT	MTB	CL	INVREC	INST	SIZE
Panel A							
MFG	1.00						
HASDEBT	0.05	1.00					
MTB	−0.08	−0.03	1.00				
CL	0.01	0.05	0.04	1.00			
INVREC	−0.01	0.09	−0.05	0.34	1.00		
INST	0.00	0.06	0.05	−0.01	−0.12	1.00	
SIZE	−0.02	0.06	0.15	−0.01	−0.31	0.57	1.00

	MFG	HASDEBT	MTB_ RANK	CL_ RANK	INVREC_ RANK	INST_ RANK	SIZE_ RANK
Panel B							
MFG	1.00						
HASDEBT	0.05	1.00					
MTB_RANK	−0.03	−0.03	1.00				
CL_RANK	0.01	0.06	0.06	1.00			
INVREC_RANK	0.01	0.07	−0.06	0.34	1.00		
INST_RANK	0.03	0.06	0.12	0.02	−0.08	1.00	
SIZE_RANK	−0.03	0.04	0.25	0.01	−0.19	0.50	1.00

Pooled Pearson correlations are reported for the period 1987–2001. The correlations are restricted to the sub-sample of 17,338 firm-years with data available on institutional ownership. Correlations significant at the 5% level are marked in bold. Please see Appendix A for variable descriptions.

where Y_t, the dependent variable, is sequentially set equal to abnormal CFO, abnormal discretionary expenses, and abnormal production costs.

Table 7A presents the results of regression (7). H3A predicts that the coefficient of abnormal production costs on MFG*SUSPECT_NI should be positive. Consistent with this, β_{10} is 0.0456 and significant at the 5% level ($t = 5.92$) when abnormal production costs is the dependent variable. H4A predicts the coefficient on HASDEBT*SUSPECT_NI should be negative with abnormal discretionary expenses as the dependent variable and positive with abnormal production costs as the dependent variable. Consistent with this, β_{11} is −0.0765 ($t = -3.98$) when the dependent variable is abnormal discretionary expenses and 0.0261 ($t = 2.21$) when the dependent variable is abnormal production costs.[29]

H5A predicts that the coefficient on MTB_RANK*SUSPECT_NI should be negative with abnormal discretionary expenses as the dependent variable and positive with abnormal production costs as the dependent variable. I find evidence in support of H5A. β_{12} is −0.0509 ($t = -2.54$) when the dependent variable is abnormal discretionary expenses. When the dependent variable is abnormal production costs, β_{12} is significantly positive (0.0267, $t = 2.10$), as predicted. H6A predicts the coefficient on

[29]In untabulated results, I check for cross-sectional variation in real activities manipulation with leverage, defined as the ratio of book value of debt to the market value of equity. I replace HASDEBT in regression (7) by LEV_RANK, a binary rank variable that assumes a value of one when industry-year adjusted financial leverage at the beginning of the year is above the median and zero otherwise. I do not find any evidence of an association between LEV_RANK and my measures of real activities manipulation.

Table 7A
Cross-sectional variation in real activities manipulation

	Abnormal CFO	Abnormal discretionary expenses	Abnormal production costs
Intercept	0.0140**	−0.0506**	0.0220**
	(2.88)	(−5.73)	(3.71)
Net Income	0.2177**	−0.0866**	−0. 1705**
	(7.48)	(−4.16)	(−7.06)
SUSPECT_NI	−0.0147	0.0859**	0.0010
	(−0.66)	(2.27)	(0.03)
MFG	0.0024	0.0102**	−0.0098**
	(0.98)	(2.72)	(−3.15)
HASDEBT	−0.0098**	−0.0432**	0.0212**
	(−2.50)	(−4.61)	(2.79)
MTB_RANK	0.0082**	0.0613**	−0.0520**
	(3.49)	(17.24)	(−13.43)
CL_RANK	−0.0185**	0.0551**	−0.0195**
	(−7.63)	(17.54)	(−8.27)
INVREC_RANK	−0.0233**	0.0096**	0.0085*
	(−6.62)	(3.92)	(1.84)
INST_RANK	0.0001	0.0198**	−0.0054**
	(0.01)	(3.77)	(−2.14)
SIZE_RANK	0.0123**	0.0108**	−0.0070
	(3.36)	(2.75)	(−1.52)
MFG * SUSPECT_NI	−0.0133*	−0.0572**	0.0456**
	(−1.78)	(−6.29)	(5.92)
HASDEBT*SUSPECT_NI	0.0195	−0.0765**	0.0261**
	(1.12)	(−3.98)	(2.21)
MTB_RANK* SUSPECT_NI	0.0060	−0.0509**	0.0267**
	(0.75)	(−2.54)	(2.10)
CL_RANK* SUSPECT_NI	−0.0107	−0.0110*	0.0009
	(−1.21)	(−1.70)	(0.09)
INVREC_RANK* SUSPECT_NI	−0.0144	−0.0458**	0.0658**
	(−1.48)	(−3.78)	(4.03)
INST_RANK*SUSPECT_NI	−0.0146	0.0631**	−0.0524**
	(−1.14)	(6.38)	(−5.72)
SIZE_RANK*SUSPECT_NI	0.0078	−0.0366**	0.0055
	(0.61)	(−2.32)	(0.16)

*Significant at the 10% level. **Significant at the 5% level.

This table reports the results of Fama–Macbeth regressions, over a period of 15 years from 1987 to 2001. The sample includes 17,338 observations, including 389 suspect firm-years. The regressions being estimated are of the form

$$\begin{aligned}Y_t = {}& \alpha + \beta_1(\text{Net income})_t + \beta_2(\text{SUSPECT\_NI})_t + \beta_3(\text{MFG})_t + \beta_4(\text{HASDEBT})_{t-1} + \beta_5(\text{MTB\_RANK})_{t-1}\\ &+ \beta_6(\text{CL\_RANK})_t + \beta_7(\text{INVREC\_RANK})_{t-1} + \beta_8(\text{INST\_RANK})_t + \beta_9(\text{SIZE\_RANK})_{t-1}\\ &+ \beta_{10}(\text{MFG})_t(\text{SUSPECT\_NI})_t + \beta_{11}(\text{HASDEBT})_{t-1}(\text{SUSPECT\_NI})_t\\ &+ \beta_{12}(\text{MTB\_RANK})_{t-1}(\text{SUSPECT\_NI})_t + \beta_{13}(\text{CL\_RANK})_t(\text{SUSPECT\_NI})_t\\ &+ \beta_{14}(\text{INVREC\_RANK})_{t-1}(\text{SUSPECT\_NI})_t + \beta_{15}(\text{INST\_RANK})_t(\text{SUSPECT\_NI})_t\\ &+ \beta_{16}(\text{SIZE\_RANK})_{t-1}(\text{SUSPECT\_NI})_t + \varepsilon_t.\end{aligned}$$

Each column presents the results of the above regression for a different dependent variable, whose name appears at the top of the respective column. T-statistics are calculated using standard errors corrected for autocorrelation using the Newey–West procedure. They are reported in parentheses. Please see Appendix A for variable descriptions.

CL_RANK*SUSPECT_NI should be negative with abnormal discretionary expenses as the dependent variable and positive with abnormal production costs as the dependent variable. I find statistically weak evidence of abnormally low discretionary expenses for suspect firm-years with high current liabilities, and no evidence of unusually high production costs for these firm-years.[30]

H7A predicts that the coefficient on INVREC_RANK*SUSPECT_NI should be positive with abnormal production costs as the dependent variable. Consistent with this, β_{14} is 0.0658 ($t = 4.03$) when the dependent variable is abnormal production costs. Interestingly β_{14} is significantly negative (-0.0458, $t = -3.78$) when the dependent variable is abnormal discretionary expenses, indicating that discretionary expenses reduction is more aggressive when the stock of inventories and receivables is higher.

H8A predicts that the coefficient on INST_RANK*SUSPECT_NI should be *positive* with abnormal discretionary expenses as the dependent variable and *negative* with abnormal production costs as the dependent variable. Consistent with this, β_{15} is 0.0631 ($t = 6.38$) when the dependent variable is abnormal discretionary expenses and -0.0524 ($t = -5.72$) when the dependent variable is abnormal production costs. Finally, Table 7A also demonstrates that abnormal production costs are not significantly correlated with SIZE, although abnormal discretionary expenses vary negatively with SIZE. There is no appreciable cross-sectional variation in abnormal CFO. However, as discussed earlier, this is probably because of joint variation in abnormal CFO-increasing activities (price discounts, overproduction) and abnormal CFO-decreasing activities (discretionary expenditure reduction).

Table 7B replaces the binary rank variables with the corresponding industry-year adjusted continuous variables. For example, INST_RANK is replaced by INST, CL_RANK by CL, and so on. The results are broadly consistent with those in Table 7A, with one exception. Unlike the results in Table 7A, the results in Table 7B offer support for H6A, which states that the extent of real activities manipulation should be positively correlated with the level of current liabilities. The coefficient on CL*SUSPECT_NI is -0.2920 ($t = -2.35$) when the dependent variable is abnormal discretionary expenses and 0.2302 ($t = 3.51$) when the dependent variable is abnormal production costs.

In summary, there is consistent and statistically strong evidence of a negative correlation between the measures of real activities manipulation and institutional ownership. The evidence of real activities manipulation to avoid losses appears to be more concentrated in manufacturing industries. Firms engage in real activities manipulation to avoid losses more aggressively when they have debt outstanding and when they have high MTB. Real activities manipulation seems to vary positively with the stock of inventories and receivables. Finally, there also exists some (but less robust) evidence that when firms have more short-term creditors, managers engage in greater real activities manipulation to avoid losses.

5.4. Performance matching

In this section, I investigate whether my primary results on firms avoiding losses are robust to relaxing the assumption that the relations between the abnormal levels of various

[30] I alternately define the binary rank variable CL_RANK such that it assumes a value of one when the firm's CL is in the top decile for the corresponding year. This new definition does not yield a significant coefficient on CL_RANK either.

Table 7B
Cross-sectional variation in real activities manipulation

	Abnormal CFO	Abnormal discretionary expenses	Abnormal production costs
Intercept	0.0037	0.0317**	−0.0228**
	(0.90)	(3.59)	(−4.29)
Net Income	0.2442**	−0.0865**	−0.2052**
	(8.39)	(−2.17)	(−7.86)
SUSPECT_NI	−0.0485**	0.0600	0.0108
	(−2.80)	(1.61)	(0.39)
MFG	0.0006	0.0116**	−0.0021
	(0.24)	(2.93)	(−0.92)
HASDEBT	−0.0072*	−0.0364**	0.0179**
	(−1.85)	(−3.73)	(2.69)
MTB	0.0015**	0.0059**	−0.0057**
	(4.02)	(6.49)	(−5.71)
CL	−0.0992**	0.2865**	−0.1157**
	(−7.96)	(10.46)	(−6.11)
INVREC	−0.1083**	0.0159	0.1143**
	(−7.06)	(0.72)	(7.08)
INST	0.0036	0.0350*	−0.0067
	(0.62)	(1.91)	(−1.06)
SIZE	−0.0008	0.0064**	−0.0003
	(−0.76)	(5.08)	(−0.24)
MFG * SUSPECT_NI	−0.0042	−0.0537**	0.0512**
	(−0.55)	(−2.64)	(3.54)
HASDEBT*SUSPECT_NI	0.0210	−0.0684**	0.0236**
	(1.19)	(−3.81)	(2.99)
MTB * SUSPECT_NI	−0.0019	−0.0048*	0.0137*
	(−1.07)	(−1.90)	(1.75)
CL * SUSPECT_NI	−0.0933	−0.2920**	0.2302**
	(−1.42)	(−2.35)	(3.51)
INVREC * SUSPECT_NI	0.0044	−0.1126**	0.1674**
	(0.08)	(−2.08)	(2.71)
INST *SUSPECT_NI	−0.0252	0.0764**	−0.1392**
	(−0.69)	(2.82)	(−3.20)
SIZE *SUSPECT_NI	0.0055*	−0.0042	−0.0060
	(1.70)	(−0.58)	(−0.77)

*Significant at the 10% level. **Significant at the 5% level.

This table reports the results of Fama–Macbeth regressions, over a period of 15 years from 1987 to 2001. The sample includes 17,338 observations, including 389 suspect firm-years. The regressions being estimated are of the form

$$\begin{aligned}Y_t = {} & \alpha + \beta_1(\text{Net income})_t + \beta_2(\text{SUSPECT\_NI})_t + \beta_3(\text{MFG})_t + \beta_4(\text{HASDEBT})_{t-1} \\ & + \beta_5(\text{MTB})_{t-1} + \beta_6(\text{CL})_t + \beta_7(\text{INVREC})_{t-1} + \beta_8(\text{INST})_t + \beta_9(\text{SIZE})_{t-1} \\ & + \beta_{10}(\text{MFG})_t(\text{SUSPECT\_NI})_t + \beta_{11}(\text{HASDEBT})_{t-1}(\text{SUSPECT\_NI})_t \\ & + \beta_{12}(\text{MTB})_{t-1}(\text{SUSPECT\_NI})_t + \beta_{13}(\text{CL})_t(\text{SUSPECT\_NI})_t \\ & + \beta_{14}(\text{INVREC})_{t-1}(\text{SUSPECT\_NI})_t + \beta_{15}(\text{INST})_t(\text{SUSPECT\_NI})_t \\ & + \beta_{16}(\text{SIZE})_{t-1}(\text{SUSPECT\_NI})_t + \varepsilon_t.\end{aligned}$$

Each column presents the results of the above regression for a different dependent variable, whose name appears at the top of the respective column. T-statistics are calculated using standard errors corrected for autocorrelation using the Newey-West procedure. They are reported in parentheses. Please see Appendix A for variable descriptions.

variables and earnings performance are linear. I use the performance-matching technique advocated by Kothari et al. (2005), hereafter KLW. Every firm-year is matched to the firm-year in its industry that has the closest net income scaled by total assets in the previous year. Performance-matched production costs for a firm-year are the abnormal production costs of that firm-year in excess of the abnormal production costs for the matching firm-year. Performance-matched values of other variables, such as CFO and discretionary expenses are estimated similarly.

Table 8A replicates the results in Table 4 with performance-matched CFO, discretionary expenses, and production costs. Suspect firm-years exhibit significantly negative performance-matched CFO, significantly negative performance-matched discretionary expenses, and significantly positive performance-matched production costs.

Table 8B replicates the results on cross-sectional variation in Table 7A, using performance-matched variables. The results on the interacted variables are broadly similar to those in Table 7A, with one exception. Using performance-matched variables, I find a significant relation between the extent of real activities manipulation and the level of current liabilities. Suspect firm-years with higher current liabilities have significantly higher performance-matched production costs and significantly lower performance-matched discretionary expenses. As in Table 7A, I find statistically significant evidence that firms in manufacturing industries, firms with a higher stock of inventories and receivables, and firms with debt outstanding exhibit evidence of unusually low discretionary expenses and unusually high production costs. The evidence of a negative correlation between institutional ownership and real activities manipulation is also robust to performance matching. There is weak evidence that growth opportunities affect real activities manipulation. In general, results on H1A through H8A are remarkably robust to performance matching.

Table 8A
Comparison of suspect firm-years with the rest of the sample, using performance-matched variables

	Performance-matched CFO	Performance-matched discretionary expenses	Performance-matched production costs
Intercept	−0.0009	0.0034*	−0.0001
	(−1.48)	(1.84)	(−0.07)
SIZE	−0.0054**	0.0084**	0.0041**
	(−4.99)	(3.66)	(2.22)
MTB	0.0010	0.0026	−0.0020**
	(1.28)	(1.09)	(−2.45)
Net income	0.1107**	−0.0533	−0.0900**
	(3.80)	(−1.10)	(−2.35)
SUSPECT_NI	−0.0116**	−0.0456**	0.0283**
	(−2.48)	(−4.16)	(2.28)

*Significant at the 10% level. **Significant at the 5% level.

This table replicates the results in Table 4 with performance-matched variables. Every firm-year is matched to the firm-year in its industry that has the closest net income scaled by total assets in the previous year. *Performance-matched* production costs for a firm-year is the abnormal production costs of that firm-year in excess of the abnormal production costs for the matching firm-year. Performance-matched values of CFO and discretionary expenses are estimated similarly. *T*-statistics are calculated using standard errors corrected for autocorrelation using the Newey-West procedure. They are reported in parentheses. Please see Appendix A for other variable descriptions.

Table 8B
Cross-sectional variation with performance-matched variables

	Performance-matched CFO	Performance-matched discretionary expenses	Performance-matched production costs
Intercept	0.0194**	−0.0365**	0.0121*
	(3.02)	(−3.87)	(1.94)
Net Income	0.1081**	−0.0389	−0. 0966**
	(5.74)	(−1.30)	(−6.48)
SUSPECT_NI	0.0050	0.1167**	−0.0507
	(0.18)	(2.44)	(−1.64)
MFG	0.0011	0.0020	−0.0036
	(0.49)	(0.86)	(−1.22)
HASDEBT	0.0002	−0.0102	−0.0056
	(0.07)	(−1.40)	(−0.78)
MTB_RANK	0.0030	0.0296**	−0.0325**
	(1.35)	(3.65)	(−4.71)
CL_RANK	−0.0169**	0.0451**	−0.0089
	(−5.30)	(6.19)	(−1.33)
INVREC_RANK	−0.0286**	0.0099*	0.0141**
	(−5.46)	(1.85)	(3.13)
INST_RANK	−0.0095**	0.0283**	−0.0044
	(−3.20)	(4.13)	(−1.48)
SIZE_RANK	−0.0010	−0.0093	0.0175**
	(−0.20)	(−1.33)	(2.41)
MFG * SUSPECT_NI	−0.0324**	−0.0547**	0.0796**
	(−2.32)	(−4.23)	(3.22)
HASDEBT*SUSPECT_NI	0.0088	−0.0621**	0.0455**
	(1.23)	(−2.15)	(2.06)
MTB_RANK* SUSPECT_NI	0.0156	−0.0621*	0.0518*
	(0.99)	(−1.85)	(1.67)
CL_RANK* SUSPECT_NI	0.0028	−0.0755**	0.0269*
	(0.18)	(−2.64)	(1.92)
INVREC_RANK* SUSPECT_NI	−0.0117**	−0.0388**	0.0611**
	(−2.34)	(−2.92)	(2.13)
INST_RANK*SUSPECT_NI	−0.0146	0.0803**	−0.0760**
	(−0.98)	(2.23)	(−2.60)
SIZE_RANK*SUSPECT_NI	0.0151	−0.0286	−0.0170
	(0.75)	(−0.68)	(−0.39)

*Significant at the 10% level. **Significant at the 5% level.
This table replicates the results in Table 7A with performance-matched variables. Every firm-year is matched to the firm-year in its industry that has the closest net income scaled by total assets in the previous year. *Performance-matched* production costs for a firm-year is the abnormal production costs of that firm-year in excess of the abnormal production costs for the matching firm-year. Performance-matched values of CFO and discretionary expenses are estimated similarly. *T*-statistics are calculated using standard errors corrected for autocorrelation using the Newey–West procedure. They are reported in parentheses. Please see Appendix A for other variable descriptions.

5.5. Alternate earnings threshold—annual analyst forecasts

Prior research has demonstrated that the discontinuity at zero in the distribution of frequency of firm-years occurs not only when firm-years are grouped by earnings levels, but also by analyst forecast errors and earnings changes.[31] These benchmarks provide additional settings in which to test for real activities manipulation. In this section, I investigate whether firms engage in real activities manipulation to avoid missing annual consensus analyst forecasts. The tests use current-year performance-matched CFO, production costs, and discretionary expenses.

As an earnings benchmark, the analyst forecast is different from zero earnings along one important dimension. Because of forecast revisions that continue beyond the year-end until shortly before the earnings announcement, forecasts represent a *moving* target for real activities manipulation, unlike zero earnings. Managers are aware that forecasts observed during the year are subject to change. Thus, it is not clear which forecasts managers regard as their targets during the year. I consider the mean of all analysts' final forecasts outstanding prior to the earnings announcement date, or the final consensus. The final consensus can be thought of as an ex post proxy for what managers expect the final consensus to be during the year.[32] Later in this section, I also report (untabulated) results using the mean of all analysts' most current forecasts outstanding prior to year-end. Managers observe this consensus prior to year-end, but are aware that it is subject to change.

I obtain annual analyst forecasts from I/B/E/S, considering only those forecasts made/revised after the beginning of the fiscal year. The forecast error is defined as actual earnings per share (EPS) minus the consensus forecast of EPS. I also obtain actual EPS figures from I/B/E/S to make them comparable to forecasted EPS. I obtain historical values of forecasted and actual EPS to avoid problems that arise from using split-adjusted data.[33] Suspect firm-years have an analyst forecast error of one cent. Out of the original sample of 21,758 firm years, I include 11,640 firm-years with data on analyst forecasts in the following analysis. The following regression is estimated using the Fama–Macbeth procedure:

$$Y_t = \alpha + \beta_1(\text{SIZE})_{t-1} + \beta_2(\text{MTB})_{t-1} + \beta_3(\text{Net income})_t + \beta_4(\text{SUSPECT\_FE})_t + \varepsilon_t. \tag{8}$$

SUSPECT_FE is a binary zero/one indicator variable that is set equal to one if the final consensus forecast error before the earnings announcement date is one cent. It equals one for 1352 firm-years, including 866 individual firms. The dependent variables used in the regression are performance-matched CFO, productions costs, and discretionary expenses. I report the results in Table 9.

The first two columns in both Panels A and B provide evidence in support of H1A. Firm-years that just miss the forecasts exhibit significantly negative performance-matched CFO, *and* significantly negative performance-matched discretionary expenses. With performance-matched production costs as the dependent variable, β_4 is significantly positive ($\beta_4 = 0.0076$, $t = 2.10$), consistent with H2.

When forecast error is defined with respect to the consensus *before* fiscal year-end, the evidence is similar to that in Table 9, but barely significant at the 10% level (results

[31]Burgstahler and Dichev (1997), Degeorge et al. (1999), and Beaver et al. (2003b) are some of the studies that have documented these discontinuities.

[32]It is reasonable to assume managers can form expectations of the final consensus forecast during the year, given their ability to guide analysts.

[33]See Payne and Thomas (2003).

Table 9
Comparison of firm-years that just beat analyst forecasts with the rest of the sample

	Performance-matched CFO	Performance-matched discretionary expenses	Performance-matched production costs
Intercept	−0.0069**	0.0095**	0.0006
	(−7.63)	(4.11)	(0.33)
SIZE	0.0045**	−0.0030**	0.0002
	(7.95)	(−2.53)	(0.19)
Market-to-book	0.0002	0.0026**	−0.0024**
	(1.02)	(2.86)	(−3.68)
Net income	0.0414**	−0.0457**	−0.0385**
	(3.05)	(−2.97)	(−209)
SUSPECT_FE	−0.0066**	−0.0166**	0.0076**
	(2.39)	(−2.09)	(2.10)

*Significant at the 10% level. **Significant at the 5% level.
This table reports the results of Fama–Macbeth regressions, over a period of fifteen years from 1987 to 2001. The total sample includes 11,670 observations. The regressions being estimated are of the form

$$Y_t = \alpha + \beta_1(\text{SIZE})_{t-1} + \beta_2(\text{MTB})_{t-1} + \beta_3(\text{Net income})_t + \beta_4(\text{SUSPECT\_FE})_t + \varepsilon_t.$$

Each column presents the results of the above regression for a different dependent variable, whose name appears at the top of the respective column. Every firm-year is matched to the firm-year in its industry that has the closest net income scaled by total assets in the current year. *Performance-matched* production costs for a firm-year is the abnormal production costs of that firm-year in excess of the abnormal production costs for the matching firm-year. Performance-matched values of CFO and discretionary expenses are estimated similarly. *T*-statistics are calculated using standard errors corrected for autocorrelation using the Newey–West procedure. They are reported in parentheses. Please see Appendix A for other variable descriptions.

untabulated). The stronger results obtained when using forecast errors with respect to the *final* consensus suggest the possibility that managers manipulate real activities during the year to meet their expectations of the final consensus forecast.

Using the same explanatory variables as in regression (7) of Section 5.3, I find that market-to-book and the stock of inventories and receivables are the variables most significantly associated with real activities manipulation to meet/beat annual analyst forecasts.[34] A detailed examination of the factors affecting real activities manipulation to meet/beat analyst forecasts is left for future research.

6. Conclusion

This paper complements the existing literature on earnings management in several ways. First, this study develops empirical methods to detect real activities manipulation in large samples. In prior literature on real activities manipulation, the focus has mostly been limited to the reduction of discretionary expenditures. Second, the paper documents evidence consistent with real activities manipulation around earnings thresholds commonly discussed in the literature, in particular, the zero threshold. Third, this paper

[34]Higher MTB and greater stock of inventories and receivables are associated with greater manipulation.

provides insights into factors that affect the nature and extent of real activities manipulation. For example, I find a negative association between institutional ownership and real activities manipulation. If the abnormal real activities that managers undertake to avoid losses represent optimal responses to economic circumstances, it is difficult to explain why the presence of sophisticated investors restricts such activities. There also exists evidence that the presence of debt, the stock of inventories and receivables, and growth opportunities are positively associated with real activities manipulation. Finally, I also find evidence of real activities manipulation among firms trying to avoid negative annual forecast errors. A deeper analysis of cross-sectional variation in earnings management to meet forecasts is left for future analysis.

A number of studies use the distribution of the frequency of firm-years to argue that executives manage earnings up to avoid reporting losses and missing forecasts. My paper provides additional evidence that firms reporting small positive profits and small positive forecast errors manage earnings through real activities. The results indicate that drawing inferences on earnings management by analyzing only accruals is probably inappropriate. This paper also raises several questions for future research. One important issue is how managers choose between real activities manipulation versus accrual manipulation when they have the flexibility to engage in both. Another area for further research is the timing of real activities manipulation. While they have to occur during the year, their intensity should increase toward the end of the year, as managers form more reliable expectations of pre-managed earnings for the year.

Further, it would be interesting to investigate whether firms that engage in manipulation of real activities habitually engage in such practices. For example, do firms that accelerate the timing of sales in a bad year through price discounts have incentives to do the same the following year? A related issue is whether the stock market understands the current and future implications of real activities manipulation. Research on these issues should lead to a more complete understanding of the importance of meeting earnings targets, the extent of earnings management through real activities, and the long-term effects of real activities manipulation.

Appendix A. variable descriptions

MVE	The market value of equity, COMPUSTAT data#199*data#25
A	Total assets, COMPUSTAT data#6
BVE	The book value of equity, COMPUSTAT data#60
IBEI	Income before extraordinary items, COMPUSTAT data#18
CFO	Cash flow from operations, COMPUSTAT data#308
Accruals	IBEI–CFO
COGS	Cost of goods sold, COMPUSTAT data#44
Production costs (PROD)	COGS + Change in inventory, inventory is COMPUSTAT data#3
Discretionary expenses (DISEXP)	R&D (data#46) + Advertising (data#45) + Selling, General and Administrative expenses (data#189); as long as SG&A is available, advertising and R&D are set to zero if they are missing

S	Sales, COMPUSTAT data#12
ΔS	Change in sales
Inventory turnover ratio	[COGS]/[Beginning inventory + Ending inventory)/2]
Receivables turnover ratio	S/[(Beginning gross receivables + Ending gross receivables)/2]
Institutional ownership	Percentage of outstanding shares owned by institutional owners, from the Thomson Financial database
PPE	Property, plant and equipment, COMPUSTAT data#7; defining as data#8 does not affect results
Abnormal CFO	Measured as deviations from the predicted values from the corresponding industry-year regression $CFO_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \varepsilon_t$
Abnormal DISEXP	Abnormal discretionary expenses, measured as deviations from the predicted values from the corresponding industry-year regression $DISEXP_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta(S_{t-1}/A_{t-1}) + \varepsilon_t$
Abnormal production costs	Measured as deviations from the predicted values from the corresponding industry-year regression $PROD_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \beta_3(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t$
Abnormal accruals	Measured as deviations from the predicted values from the corresponding industry-year regression, $Accruals_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(\Delta S_t/A_{t-1}) + \beta_2(PPE_{t-1}/A_{t-1}) + \varepsilon_t$
SUSPECT_NI	An indicator variable that is set equal to one if income before extraordinary items (IBEI) scaled by lagged total assets (A) is between 0 and 0.005, and is set equal to zero otherwise
Net income	Income before extraordinary items (IBEI) scaled by lagged total assets (A), expressed as deviation from the corresponding industry-year mean
SIZE	Logarithm of MVE, expressed as deviation from the corresponding industry-year mean
MTB	The ratio of MVE to the BVE, expressed as deviation from the corresponding industry-year mean
MFG	An indicator variable set equal to one if the firm belongs to a manufacturing industry, and is set equal to zero otherwise
HASDEBT	An indicator variable set equal to one if there is long-term (data#9) or short-term (data#34) debt outstanding at the beginning of the year or at the end of the year
CL	Current liabilities (data#5) excluding short-term debt (data#34), scaled by total assets and expressed as deviation from the corresponding industry-year mean
INVREC	The sum of industry-year adjusted inventories (data#3) and receivables (data#2) as a percentage of total assets, and expressed as deviation from the corresponding industry-year mean

INST	Percentage of outstanding shares owned by institutional owners, expressed as deviation from the corresponding industry-year mean, from the Thomson Financial database
SIZE_RANK	SIZE_RANK is a binary rank variable, set equal to zero if SIZE is below the median value for the corresponding year, and one otherwise
MTB_RANK	MTB_RANK is a binary rank variable, set equal to zero if MTB is below the median value for the corresponding year, and one otherwise
CL_RANK	CL_RANK is a binary rank variable, set equal to zero if CL is below the median value for the corresponding year, and one otherwise
INVREC_RANK	INVREC_RANK is a binary rank variable, set equal to zero if INVREC is below the median value for the corresponding year, and one otherwise
INST_RANK	INST_RANK is a binary rank variable, set equal to zero if INST is below the median value for the corresponding year, and one otherwise
SUSPECT_FE	An indicator variable that is set equal to one if forecast error with respect to final mean consensus analyst forecast is one cent.

Appendix B. The model for 'normal' accruals and cash flows

Dechow et al. (1998) present a model that relates the earnings of a company to its cash flows and accruals. They make some simplifying assumptions: absent manipulation, sales follow a random walk, accounts receivables at the end of the year are a constant fraction of current year's sales, target inventories at the end of the year are a constant fraction of next period forecasted cost of sales, accounts payable are a constant percentage of the firm's purchases during the year and there are no fixed costs.[35] Note that these are the same assumptions underlying the Jones (1991) model of non-discretionary accruals. Earnings can be represented as

$$E_t = \pi S_t, \tag{A.1}$$

where π is the profit margin, E_t is earnings for period t and S_t is sales for period t.

Dechow et al. (1998) presume the following about current asset items.

Accounts receivables, AR_t, are given by a constant fraction α of sales in period t.

$$AR_t = \alpha S_t.$$

Target inventory is a constant fraction, γ_1, of next period's forecasted cost of sales. Under the assumptions that sales follows a random walk, target inventory at end of period t is $\gamma_1(1-\pi)S_t$, $\gamma_1 > 0$. Actual inventory deviates from target inventory because of sales realizations in period t different from what was expected for period t, and it can be shown

[35]The assumption of zero fixed costs is not very descriptive of real-world firms. However, it is also probably not very costly while estimating abnormal accruals or cash flows. Please see discussion at the end of this Appendix.

that the deviation is given by $\gamma_2\,\gamma_1\,(1-\pi)(S_t-S_{t-1})$, where γ_2 is a constant that captures the speed with which a firm adjusts its inventory to its target level. So, actual inventory at the end of period t is given by

$$\mathrm{INV}_t = \gamma_1(1-\pi)S_t - \gamma_2\gamma_1(1-\pi)(S_t - S_{t-1}).$$

Purchases are calculated as (cost of goods sold + closing inventory—opening inventory). Accounts payable at the end of period t are a constant fraction β of that amount. Working capital is defined as (accounts receivable + inventory−accounts payable). The change in working capital in period t gives the accruals for period t, $\mathrm{A_t}$.

$$A_t = [\alpha + (1-\pi)\gamma_1 - (1-\pi)\beta]\varepsilon_t - (1-\pi)\gamma_1[\beta + \gamma_2(1-\beta)]\Delta\varepsilon_t + (1-\pi)\gamma_1\gamma_2\beta\Delta\varepsilon_{t-1}, \tag{A.2}$$

where, α is the constant percentage of accounts receivables to sales, β the constant percentage of accounts payable to purchases, γ_1 the constant percentage of target inventory to expected cost of sales next period, γ_2 a constant that represents speed at which firm adjusts inventory, $\varepsilon_\mathrm{t} = S_t - S_{t-1}$, Δ is the first difference operator.

Dechow et al. (1998) further simplify this expression by noting that the second and the third terms are likely to be negligible in practice and denoting $[\alpha+(1-\pi)\gamma_1-(1-\pi)\beta]$ by Δ.

Essentially, Δ is a measure of the operating cash cycle and accruals in this model would be the operating cash cycle times the change in sales, or the sales shock, given last period's expectation.

After this simplification, accruals are given by

$$A_t = \Delta\varepsilon_t.$$

This is the basic underlying equation for the Jones (1991) model for determining normal working capital accruals. To estimate normal depreciation accruals, Jones (1991) also includes property, plant and equipment as an explanatory variable.

Cash flows from operations, CFO_t, is then given by

$$\mathrm{CFO}_t = E_t - A_t = \pi S_t - \delta\varepsilon_t = \pi S_t - \delta(S_t - S_{t-1}). \tag{A.3}$$

The above equation expresses cash flows as a function of current-period sales and last-period sales. This is the equation I use in my subsequent regressions.

The estimation equation does not change much in the presence of fixed costs. Eq. (3) is augmented by another term, the change in outflow on fixed costs, assuming that fixed expenses are paid in cash. Incorporating this in the equation would make the model for normal cash flows more powerful, but I omit this term for the sake of simplicity. Besides, in my estimation of abnormal cash flow from operations, I include industry membership, size and the market-to-book ratio. To the extent that operating leverage is likely to be correlated with these variables, I do control for the effect of fixed costs.

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