What Are the Consequences of Real Earnings Management?

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Abstract

This paper examines the consequences of four types of real earnings management. Using financial statement data, I identify firms that engage in any of the following real earnings management activities: (1) myopically investing in R&D to increase income, (2) myopically investing in SG&A to increase income, (3) timing of income recognition from the disposal of long-lived assets and investments, and (4) cutting prices to boost sales in the current period and /or overproducing to decrease COGS expense. Then, I explicitly examine (i) the extent to which real earnings management affects subsequent operating performance (as measured by both earnings and cash flows), and (ii) whether market participants (investors and analysts) expect the subsequent decline in performance. The empirical results are consistent with all four types of real earnings management activities having a significantly negative impact on future operating performance. Additionally, it appears that investors recognize the future earnings implications of myopic investment in SG&A and cutting prices and/or overproducing to increase current period income. The results are inconsistent with investors recognizing the future earnings implications of myopic investment in R&D and the strategic timing of asset sales. The results are consistent with analysts recognizing the future earnings implications of all four types of real earnings management.

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1. Introduction

Earnings management can be classified into three categories: fraudulent accounting, accruals management and real earnings management. Fraudulent accounting involves accounting choices that violate GAAP. Accruals management involves within-GAAP choices that try to "obscure" or "mask" true economic performance (Dechow and Skinner, 2000). Real earnings management (RM) occurs when managers undertake actions that deviate from the first best practice to increase reported earnings.[1] This paper examine the extent to which real earnings management affects subsequent operating performance and whether investors and analysts recognize the consequences of real earnings management.

Schipper (1989) was one of the first to include RM in the definition of earnings management. She describes earnings management as "*a purposeful intervention in the external financial reporting process, with the intention of obtaining some private gain…[a] minor extension of this definition would encompass "real" earnings management, accomplished by timing investment or financing decision to alter reported earnings or some subset of it.*"

Fraudulent accounting and accruals management are not accomplished by changing the underlying economic activities of the firm but through the choice of accounting methods used to represent those underlying activities. In contrast, RM is accomplished by changing the firm's underlying operations. Examples of RM include cutting prices towards the end of the year in an effort to accelerate sales from the next fiscal year into the current year, delaying desirable investment, and selling fixed assets to affect gains and losses, all in an effort to boost current period earnings.

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[1]Conventional wisdom in prior studies is that managers prefer higher earnings, therefore the a higher stock price and stock price is increasing in earnings (Fischer and Verrecchia, 2000). The focus of this study is on income increasing RM, however there are situations in which the manager may benefit by deflating earnings. For example, firms prior to a management buyout, vulnerable to an anti-trust investigation or seeking import relief may have incentives to lower reported earnings (Fischer and Verrecchia, 2000; Perry and Williams, 1994; Watts and Zimmerman, 1978; Jones, 1991).

Even though accruals management may be less costly, with respect to future firm value, there are several reasons managers may still engage in RM. First, aggressive accounting choices with respect to accruals are at higher risk for SEC scrutiny and class action litigation, ex post. Second, the firm may have limited accounting flexibility (i.e. limited ability to report discretionary accruals). For example, accruals management is limited by the business operations and by accrual manipulation in prior years (Barton and Simko, 2002). In addition, accruals management must take place at the end of the year and managers face uncertainty as to which accounting treatments the auditor will allow at that time. Operating decisions are controlled by the manager, whereas accounting treatments must meet the requirements of auditors.

Prior studies provide strong evidence on the existence of RM. The use of RM by managers is supported by Graham et al. (2004) who survey 401 financial executives about key factors that drive decisions about reported earnings and voluntary disclosure. They report that 78% of the executives interviewed indicated a willingness to sacrifice economic value to manage financial reporting perceptions. Furthermore, the extant empirical accounting literature confirms the existence of RM to achieve various income objectives (see Section 2).

Given the extensive evidence on the existence of RM, this study examines the extent to which RM affects subsequent operating performance. By definition, RM negatively impacts future firm performance because the manager is willing to sacrifice future cash flows for current period income. However, the extent to which various RM activities impact future operating performance has not been addressed in prior literature. Using a matched sample of firms that did not engage in RM, I find that four types of RM are associated with significantly lower future earnings and cash flows after controlling for size, performance, level of accruals and industry. Graham et al. (2004) document CFOs admitting a willingness to engage in RM "as long as the real sacrifices are not too large." However, my results suggest that RM activities are associated with an economically significant decline in subsequent operating performance.

Since the empirical results that all four types of real earnings management activities negatively affects future operating performance, my second set of tests examines whether investors and analysts recognize the consequences of RM. The results indicate that investors recognize the future earnings implications of myopic investment in SG&A and cutting prices and/or overproducing to increase current period income. However, the results are inconsistent with investors recognizing the future earnings implications of myopic investment in R&D and the strategic timing of asset sales. Analysts' expectations, as reflected in forecasts of earnings, appear to recognize the future earnings implications of all four types of RM.

Understanding the implications of RM is important not only to stakeholders of the firm but also to accounting regulators. RM is one potential consequence of regulations intended to restrict the discretion of accounting earnings management. For example, Ewert and Wagenhofer (2004) develop an analytical model and demonstrate RM increases when tightening accounting standards make accruals management more difficult. Although the present study does not specifically address the tradeoff between accruals management and RM, examining the consequences of RM provides general information relevant to assessing the costs and benefits of accounting standards that may interact with the use of RM.

This paper makes the following contributions. First, it contributes to the literature on earnings management. By undertaking a comprehensive examination of four types of RM, this paper complements extant research investigating the consequences of earnings management. Although there are several studies documenting whether RM occurs in various situations, the existing literature provides little evidence of the affect of RM on firms' subsequent operating performance. This study provides a direct assessment of the impact of RM on future earnings and cash flows. The purpose of this paper is not to identify specific motives for RM, but rather to examine the consequences of RM. As a result, this study does not focus specifically on one motive to engage in RM. I identify a broad sample of firms likely to have engaged in RM to enhance the generalizability of the results. The empirical results demonstrate that subsequent operating performance is negatively related to four types of RM.: (1) cuts in discretionary R&D, (2) cuts in discretionary SG&A, (3) selling fixed assets, and (4) overproduction reflecting an intention to cut prices or extend more lenient credit terms to boost sales and/or overproduce to decrease COGS expense.

Second, this paper contributes to the literature on whether market participants recognize the future earnings and cash flow implications of earnings management. Several studies examine whether or not market participants identify and react to earnings management. These studies examine either fraudulent accounting or accruals management (Dechow et al. 1996; Sloan, 1996; Teoh et al. 1998; Bradshaw et al. 2001). In contrast, I examine whether investors and analysts recognize the implications of RM. This study addresses the deficiencies in the existing literature by examining the implications of RM.

Third, this paper contributes to the literature on earnings quality. Persistence of earnings is an important part of the "quality of earnings."[2] In studies on financial statement analysis, researchers are interested in how current or past earnings or earnings components aid in forecasting future earnings or cash flows, both of which are central inputs in valuation models. Examining the implication of RM on operating performance is important, given the significance of future performance to the firm and its stakeholder. This paper shows that using empirical measures to identify firms that engage in RM is incrementally informative about future earnings, even after controlling for size, past performance, accruals and industry.

The remainder of the paper is organized as follows: Section 2 discusses the various types of real earnings management and presents existing evidence. Section 3 develops testable hypotheses. Section 4 describes the estimation models and the procedure to identify RM. Section 5 describes the sample. Section 6 presents the results. Section 7 provides concluding remarks.

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[2]Penman and Zhang (2002) define high quality earnings as "sustainable earnings." Similarly, Francis et al. (2003) state "higher earnings quality signals that the earnings pattern is intrinsic and therefore sustainable, as opposed to temporary and not attributable to fundamental firm characteristics."

2. Types of real earnings management (RM) activities and prior evidence

This study focuses on the following four types of real earnings management activities:

(1) decreasing discretionary R&D expense
(2) decreasing discretionary SG&A expense
(3) timing the sale of fixed assets to report gains
(4) overproduction reflecting an intention to cut prices or extend more lenient credit terms to boost sales and/or overproduce to decrease COGS expense.[3]

There are other types of RM that are not examined in this study. For example, in addition to the four RM activities listed above, Graham et al. (2004) document CFOs admitting to delaying or cutting the travel budget and maintenance expense, postponing or eliminating capital investments (to avoid depreciation charges), asset securitizations and managing the funding of pension plans. This study does not propose an exhaustive list of all potential RM activities. I focus on four commonly cited RM activities demonstrated to exist empirically in prior research. A more comprehensive examination of the other types of RM is left to future research.

2.1 Evidence on RM

2.1.1 Reduction of discretionary expense (R&D and SG&A)

Under current accounting rules, R&D expenditures must be charged to expense as incurred because of the uncertainty of future benefits associated with investment in R&D (SFAS No. 2, October 1974).[4] As a result, a manager interested in boosting current period income could choose to cut investment in R&D, particularly if the realization of the benefit associated with the forfeited R&D project would benefit the firm in a future period, without hindering current period earnings.

SG&A is included in the analysis because portions of this expense may be subject to managerial discretion. GAAP does not consistently recognize intangible assets such as brands,

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[3]Managers can attempt to decrease COGS expense in any period by overproducing to spread fixed overhead costs over a larger number of units as long as the reduction in per unit cost is not offset by inventory holding costs or any increase in marginal cost in the current period.

[4]FASB has permitted R&D to be capitalized only for certain kinds of software (SFAS 86).

technology, customer loyalty, human capital and commitment of employees as accounting assets, all of which are created by expenditures on either SG&A or advertising.[5] If the manager decided to cut employee training programs intended to increase human capital and commitment of employees, the economic consequence may not materialize in the short run but would in the long run.

Several studies provide evidence that managers cut discretionary spending to achieve earnings targets. Baber et al. (1991) provide evidence that R&D spending is significantly less when spending jeopardizes the ability to report positive or increasing income in the current period. Dechow and Sloan (1991) show that CEOs spend relatively less on R&D in their final years in office. Bushee (1998) provides evidence consistent with institutional investors mitigating the myopic investment problem. Bens et al. (2002) show that managers cut R&D and capital expenditure when faced with earnings per share dilution due to stock option exercises. Holthausen et al. (1995) find that managers do not cut R&D, advertising or capital expenditure to increase managerial bonuses. Cheng (2003) provides evidence consistent with compensation committees mitigating opportunistic reductions in R&D spending. With the exception of managerial bonus incentives, the evidence is consistent with managers myopically investing to achieve various income objectives.

2.1.2 Timing the sale of fixed assets to report gains

The timing of asset sales is a manager's choice, and since a gain is reported on the income statement at the time of the sale (the difference between the net book value and the current market value), the timing of asset sales could be used as a way to manage reported earnings. Bartov (1993) provides evidence consistent with managers selling fixed assets in order to avoid negative earnings growth and debt covenant violations. Herrmann, Inoue and Thomas

[5]Firms are not required to disclose advertising expense and if it is not separately disclosed it is included in SG&A, therefore I do not require firms to disclose advertising expense to be included in the SG&A sample. Throughout the paper any reference to SG&A expense refers to the aggregation of SG&A expense plus any advertising expense.

(2003) investigate Japanese managers' use of income from the sale of assets to manage earnings. They find that firms increase (decrease) earnings through the sale of fixed assets and marketable securities when current operating income falls below (above) management's forecast of operating income.

2.1.3 Overproduction

Roychowdhury (2003) points out that abnormally high production costs, for a given sales level, is indicative of both: (1) sales manipulation due to abnormal price discounts, and (2) COGS expense manipulation by overproduction. Sales manipulation refers to the behavior of managers that try to increase sales during the current year in an effort to increase reported earnings. By cutting prices (or extending more lenient credit terms) towards the end of the year in an effort to accelerate sales from the next fiscal year into the current year, the firm is willing to sacrifice future profits to book additional sales this period. The potential costs of sales manipulation include loss in future profitability once the firm re-establishes old prices.

Managers can manipulate COGS expense in any period by overproducing to spread fixed overhead costs over a larger number of units as long as the reduction in per-unit cost is not offset by inventory holding costs or any increase in marginal cost in the current period. I use abnormal production costs as one proxy for sales manipulation and COGS manipulation. Distinguishing between these two types of RM by analyzing COGS expense and accounts receivables is difficult because these items are susceptible to accruals manipulation.[6] It is difficult to parse out which effect is due to accruals manipulation and which is due to RM, therefore, I use abnormally high production costs as a proxy for RM of sales or COGS.

Thomas and Zhang (2002) provide evidence consistent with managers overproducing to decrease reported COGS, however, they can not rule out the possibility that the result is due to

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[6]For example, as pointed out by Roychowdhury (2003), if a manager decided to postpone a write-off of obsolete inventory to decrease reported COGS, this decision would not affect production costs because the change in inventories would be correspondingly higher. Production Costs = Cost of Goods Sold Expense + Change Inventory.

adverse economic conditions. Roychowdhury (2003) develops empirical measures for RM of discretionary expense and overproduction and finds that that managers trying to avoid reporting losses, undertake RM. Firms suspected of RM exhibit unusually low cash flow from operations, low discretionary expense and high production costs. The findings are consistent with managers offering price discounts to boost sales, myopically investing and overproducing to decrease COGS expense.

3. Hypothesis development

If a manager deviates from the optimal level of activity and engages in RM, then presumably there would be long run economic consequences. RM negatively impacts future firm performance because the manager is willing to sacrifice future cash flows for current period income. Since the future firm performance in the absence of RM is not observable, I identify a control sample of non-RM firms matched on industry, performance and accruals decile. I would expect RM firm-years to have lower subsequent operating performance compared to the control sample. Examining the subsequent operating performance between the RM firms and the control firms will allow me to assess the extent to which various RM activities impact future operating performance.

Alternatively, if the RM firms' operating performance in subsequent years is indistinguishable from the control firms, then this result would be consistent with two explanations: (1) the identified RM firms did not engage in real activities manipulation (2) the signaling hypothesis is true, that is, RM reveals managers' private information about future firm performance. Survey data by Graham et al. (2004) indicate that CFOs, knowing RM may hinder future performance, engage in RM in the hope that future earnings growth will offset current RM. Several papers find evidence consistent with earnings management being positively associated with the managers expectation of future performance (Subramanyam, 1996; DeFond and Park,1997; Altamuro et al., 2003).

Hypothesis 1: Compared to a performance, industry and accruals-matched sample, RM firm-years have relatively lower subsequent operating performance (both return on assets and cash flow from assets).

Next, I examine the behavior of investors, in an effort to assess whether investors understand the earnings implications of RM. The evidence as to whether investors recognize earnings management (specifically accruals) is mixed. On the one hand, investors seem to not fully see through earnings management as reflected in abnormal accruals (Sloan, 1996; Xie, 2001). On the other hand, in the banking and insurance industries, loan and policy loss reserves are two major accounts subject to management discretion and investors do understand the information in these accruals (Wahlen, 1994; Beaver and Engel, 1996; Liu et al., 1997; Beaver and McNichols, 2001). To ascertain whether investors detect and, therefore, react to RM, I examine the extent to investors incorporate the future earnings implications of RM into stock prices.

Hypothesis 2: After controlling for known risk factors, there is no association between firms' subsequent year returns and current-year RM.

To the extent investors detect RM, I would expect stock market prices to efficiently impound the information about RM for future earnings. Similarly, to the extent analysts detect and understand the implications of RM, I would expect no association between RM and subsequent forecast errors.[7]

Hypothesis 3: There is no association between subsequent analysts' forecast errors and current year RM.

[7]Financial statement analysis texts oftentimes implore analysts to examine various transactions related to RM. For example, Palepu, Healy and Bernard (2004) suggest that the analyst should ask "has the firm structured its activities (such as R&D, design, manufacturing, marketing and distribution, and support activities) in a way that is consistent with its competitive strategy?" Additionally, they identify selling assets to realize gains in periods when operating performance is poor as a "potential red flag" that should lead the analysts to examine this item more closely.

4. Identification of RM and estimation models

First, prior literature is used to develop models to calculate the expected (i.e. "normal") level of four accounts representing operational activities linked to RM: R&D expense, SG&A expense, gain (loss) on asset sales, and production costs. The abnormal level of each measure for every firm-year is calculated as the actual value minus the estimated normal level. Second, in an effort to increase the power of correctly identifying firms that engage in RM, I restrict the sample to firms with low accruals flexibility. Theory and empirical papers have demonstrated that firms with limited flexibility to engage in accruals management are more likely to engage in RM. The intersection of firms with abnormal account levels consistent with RM and low flexibility to engage in accruals management are identified as firms suspected of engaging in RM. For example, a firm with limited accounting flexibility and in the lowest abnormal R&D expense quintile is identified as having engaged in myopic investment in R&D. A firm with limited accounting flexibility and in the highest abnormal asset gain quintile is identified as having engaged in strategically selling assets to realize gains.

4.1 Proxy for limited ability to engage accruals management

An analytical paper by Ewert and Wagenhofer (2004) show that in the face of tightening accounting standards, managers substitute into using RM which is costly and reduces firm value. Using a simultaneous equation approach, Zang (2003) predicts and finds that firms with higher levels of previous earnings management are more likely to use RM relative to accruals management. Barton and Simko (2002) provide evidence that managers' ability to optimistically bias earnings with accruals management decreases with the extent to which net assets are already overstated on the balance sheet.

Consistent with Barton and Simko (2002), I use the beginning balance of net operating assets (i.e. shareholders' equity less cash and marketable securities, plus total debt) to identify firms with limited accounting flexibility. The rationale is that the articulation between the income statement and the balance sheet ensures that biased assumptions reflected in earnings are also reflected in net asset values. As managers attempt to improve current period earnings by deferring costs into the future, their ability to manage future earnings upward is restricted due to reversals of previously deferred costs.[8] Therefore, the balance sheet accumulates the effects of previous accounting discretion.

4.2 Estimation models

4.2.1 The normal level of R&D expense

The normal level of R&D expense is estimated using the following model:

$$\frac{RD_t}{A_{t-1}} = \alpha_0 + \beta_1 \frac{RD_{t-1}}{A_{t-1}} + \beta_2 INT_t + \beta_3 Q_t + \beta_4 CX_t + \beta_5 MV_t + \varepsilon \quad (1)$$

Where: RD = Research and Development expense deflated by lagged total assets
A = Total assets
INT = Internal Funds
Q = Tobin's Q: firm's market value divided by the replacement cost of its assets
CX = Capital Expenditures
MV = Log of Market Value of Equity

Equation (1) is based on Berger (1993) who develops an expectations model for the level of R&D intensity. The model is estimated for every year (1988-2000) and industry (48 industries based on the classification system developed by Fama and French, 1997). The independent variables are designed to control for factors that influence the level of R&D spending. The prior year's R&D serves as a proxy for the firm's R&D opportunity set and the coefficient would be expected to be positive. Internal funds is a proxy for reduced funds available for investment. Tobin's Q is a proxy for the marginal benefit to marginal cost of installing an additional unit of a new investment. Capital expenditure is a proxy for the competition for resources between capital expenditure and R&D. The adjusted R-squared for the R&D estimation model is generally above 90% for all industry-year combinations.

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[8] Barton and Simko (2002) find that higher levels of beginning-of-the-period net NOA scaled by sales are negatively associated with the probability of at least meeting the consensus analyst forecast for the current period. Hansen (2004) finds similar results using last period's earnings as the benchmark. Kasznik (1999), using change in prior accruals as the proxy for flexibility, shows that managers who overestimate earnings manage reported earnings toward their forecasts to a greater extent when they have more accounting flexibility.

4.2.2 The normal level of SG&A expense

The normal level of SG&A is estimated using the following model:

$$\log(\frac{SGA_t}{SGA_{t-1}}) = \alpha_0 + \beta_1 \log(\frac{S_t}{S_{t-1}}) + \beta_2 \log(\frac{S_t}{S_{t-1}}) * DD_t + \beta_3 \log(\frac{S_{t-1}}{S_{t-2}}) + \beta_4 \log(\frac{S_{t-1}}{S_{t-2}}) * DD_{t-1} + \varepsilon$$

(2)

Where: SGA = SG&A + Advertising expense
S = Sales
DD = Indicator variable equal to 1 when sales revenue decreases between t-1 and t, zero otherwise

The estimation of SG&A, equation (2), incorporates controls for the "sticky" cost behavior shown by Anderson, Banker and Janakiraman (2003). The model is estimated by industry and year. In particular, costs are "sticky" if the magnitude of a cost increase associated with increased sales is greater than the magnitude of a cost decrease associated with an equal decrease in sales. The general theory is that managers tradeoff the expected costs of maintaining unutilized resources during periods of weak demand with the expected adjustment costs of replacing these resources if demand is restored. Not including this element into the SG&A expectations model may lead to underestimating (overestimating) the response of costs to increases (decreases) in sales.[9] Similar to Anderson et al. (2003) the adjusted R-squared is generally above 50% for all industries and years.

4.2.3 The normal level of gains on asset sales

The normal level of gain on asset sales is estimated using the following model:

$$GainA_t = \alpha_0 + \beta_1 ASales_t + \beta_2 ISales_t + \beta_3 \log(S)_t + \beta_4 Growth_t + \varepsilon \quad (3)$$

Where: GainA = Income from asset sales deflated by beginning of the year stock price
ASales = Long-lived assets sales / market value at the beginning of the year
ISales = Long-lived investment sales / market value at the beginning of the year
S = Sales
Growth = The percentage change in sales for the current period

[9]The ratio form and log specification improves the comparability of the variables across firms and alleviates potential heteroskedasticity due to large differences in the size of firms.

Equation (3) is based on Bartov (1993) and augmented by variables in Herrmann et al. (2003) shown to influence the level of gain on asset sales. Introducing asset sales as an explanatory variable in equation (3) requires that the relation between income from asset sales (GainA) and asset sales (ASales) and investment sales (ISales) be monotonic. Therefore, the variables are transformed to make the relationship monotonic, so when income from asset sales is negative, asset sales and investment sales enter the regression with negative signs, therefore a positive coefficient would be expected.[10] Total sales (S) is included in the regression to control for any size effects. Growth is included in the regression to control for the expectation that growth firms are less likely to recognize gains because they are in a period of expansion. The average adjusted R-squared is around 30%.

4.2.4 The normal level of production costs

The normal level of production cost is estimated using the following model:

$$\frac{PROD_t}{A_{t-1}} = \alpha_0 \frac{1}{A_{t-1}} + \beta_1 \frac{S_t}{A_{t-1}} + \beta_2 \frac{\Delta S_t}{A_{t-1}} + \beta_3 \frac{\Delta S_{t-1}}{A_{t-1}} + \varepsilon \tag{4}$$

Where: PROD = COGS + ΔINV

$COGS_t$ = Cost of goods sold expense

ΔINV_t = Inventory increase/decrease

S_t = Sales

A_t = Total assets

This model is presented in Dechow et al. (1998) and implemented by Roychowdhury (2003) to estimate the "normal" level of production. The model is estimated for every year and industry. Abnormally high production costs may indicate overproduction to decrease COGS or sales manipulation. The adjusted R-squared is generally above 90% for all firm-year combinations.

4.2.5 Alternative estimation models as a robustness check

I implement supplemental analysis using alternative expectation models for R&D expense, SG&A expense and gain (loss) on asset sales. First, I model R&D and SG&A expense

[10] Income from asset sales is increasing (decreasing) in asset sales when income is positive (negative).

(deflated by assets) just as a function of sales as described by Dechow et al. (1998) and implemented by Roychowdhury (2003). These alternative specifications yield similar results, however I choose to use the expectations models that control for more factors beyond current period sales to alleviate concerns about the strategic considerations that influence the level of discretionary spending. Second, I estimate the normal level of income from asset sales as income from asset sales minus the median for the corresponding industry and year (based on Herrmann et al. 2003). The results are similar using this specification.

5. Sample selection and data

5.1 Data and sample selection

The sample consists of all firms with available financial data from COMPUSTAT industrial, full-coverage and research files and stock returns and size portfolio returns from CRSP. Firms in the financial industry (SIC 6000-7000) and utility industry (SIC 4400-5000) are excluded because they operate in highly regulated industries with accounting rules that differ from those in other industries. Only firms that are traded on the New York Stock Exchange, American Stock Exchange, and NASDAQ are included in the sample. The sample includes annual data for firms covering years from 1988 to 2000.

The sample is restricted to pre-2000 data so there are three years of subsequent earnings to examine. The sample is restricted to post-1987 data, because data on income from asset sales is not available on COMPUSTAT prior to 1987, and to facilitate the consistent calculation of accruals via the statement of cash flows.[11] The final sample consists of 32,402 firm-year observations with required financial statement variables and returns data. The four RM samples are a subset of the full sample with data available to calculate the normal level of each RM

[11]Hribar and Collins (2002) show that the accruals calculated from cash flow numbers reported by firms under SFAS 95 are less susceptible to the contaminating influences of acquisitions, mergers, and divestitures than accruals calculated from the balance sheet. SFAS 95, the standard governing the preparation of the statement of cash flows took effect in fiscal 1988.

activity. The R&D, SG&A, Asset and Production RM sample consists of 19,366, 24,628, 30,422 and 30,125 firm-year observations, respectively.

5.2 Identification of RM

To identify years when firms were likely to have engaged in RM, I first calculate the abnormal level of the four types of activities associated with RM for each firm-year. Next, I calculate the level of previous earnings management (NOA_{t-1}) for each firm-year. NOA_t equals net operating assets (shareholders' equity less cash and marketable securities plus total debt) divided by lagged assets. DeFond (2002) points out in his review of Barton and Simko (2002) that "there are likely to be systematic differences in the ratios across industries, as well as firm-specific effects on the ratios, that are unrelated to whether net assets are overstated." In an effort to mitigate this bias, I rank firms based on NOA_{t-1} by year and industry.

Barton and Simko (2002) use quarterly data, therefore in an effort to show the same discretionary accruals pattern holds annually, I replicate their analysis using annual data. Table 1 presents the mean and median prior cumulative abnormal accruals across quintiles of the beginning balance of net operating assets. NOA_{t-1} is net operating assets (i.e. shareholders' equity less cash and marketable securities, plus total debt) at the beginning of quarter t, scaled by sales for quarter t-1. Abnormal accruals are estimated for firm i in year t using the residual from the modified Jones model, estimated by two-digit SIC code. Table 1 reveals, similar to Barton and Simko (2002) who use quarterly data, that prior cumulative abnormal accruals across quintiles of NOA_{t-1} are larger for higher NOA_{t-1} quintiles. The results are consistent with the notion that the balance sheet accumulates the effects of previous accruals management and the level of net operating assets partly reflects the extent of previous earnings management.

Table 2 reports the frequency of firms by quintile of each type of abnormal RM activity in year t and quintile of net operating assets in year t-1. The column on the right presents descriptive statistics by quintile of each abnormal RM activity measure. The lower right cell in each frequency panel indicates the number of firms suspected of RM. I identify firms suspected of engaging in cutting R&D activities beyond an optimal level (R&D RM) as firms in the lowest abnormal R&D quintile in year t and the highest abnormal NOA quintile in year t-1 (976 firm-years). I identify firms suspected of engaging in cutting SG&A activities beyond an optimal level (SG&A RM) as firms in the lowest abnormal SG&A quintile and the highest abnormal NOA quintile in any given year 1,080 firm-years). I identify firms suspected of engaging in the timing of asset sales (Asset RM) as firms in the highest abnormal gain on asset quintile and highest NOA quintile in any given year (1,150 firm-years). I identify firms suspect of either sales manipulation or COGS manipulation (Production RM) as firms in the highest abnormal production quintile and highest NOA quintile in any given year (898 firm-years).

Panel A shows 976 firm-years where the firm is suspected of R&D RM. Panel B shows that 1,080 firm-years are suspected of SG&A RM. Panel C reveals that 1,150 firms are suspected of Asset RM. Panel D shows that 898 firm-years are suspected of Production RM. Unreported results reveal that the mean level of accruals deflated by average assets is not significantly higher for the RM firm-years than the rest of the sample. For example, accruals are –.045 for the 976 R&D RM firm-years and –.046 for the rest of the R&D sample (not statistically different). Scaled abnormal R&D (SG&A) expense for the lowest quintile is –13% (–24%) compared to 0% (0%) for the middle quintile. Scaled abnormal gain on asset sales (production cost) is 45% (38%) for the highest quintile compared to –3% (–4%) for the lowest quintile.

5.1.2 The inherent difficulty of identifying earnings management

Given the inherent difficulty in identifying earnings management without knowing the manager's true intention, a criticism of the earnings management literature is that any earnings management identified may be a result of an omitted variable or may be capturing behavior other than intentional manipulation. The same is true for the present study, however, I try to mitigate these concerns in a few ways. First, firms likely to have engaged in RM are identified in the two-step process explained above: (1) abnormal accounting levels consistent with RM and (2) less accounting flexibility. Limiting the sample to firms with less accounting flexibility should increase the power of detecting RM. Additionally, in the examination of subsequent return on assets, the regression controls for several other factors that may influence future profitability.

5.3 Descriptive statistics

Table 3 presents descriptive statistics for the full sample and the sample of RM firm-years. The 3,129 RM firm-years contain 2,280, 730, 112 and 7 firm-years that engage in one, two, three and four types of RM, respectively. The data reveals that RM firm-years have mean total assets of 1,243 million, similar to the full sample with total assets of 1,331 million. Mean total sales for the RM sample are smaller 772 million compared to 1,407 million for the full sample. The mean market capitalization of the RM firms, at around 902 million, is smaller than that of the full sample, 1,808 million. RM firm-years are less profitable (return on assets, cash flow from assets) compared to the full sample.

Table 3 (cont.) reports the industry composition by RM sub-sample. I use the classification scheme devised by Fama and French (1997). They categorize firms using groups of four-digit SIC codes to ensure that similar firms are grouped together. The most represented industry is business services at 13.1% of the full sample, and next is electronic equipment at 8.2% of the sample. Approximately 23% of the R&D RM sample comes from business services; the next most represented industry is pharmaceutical products. The industry compositions of the SG&A and Asset RM samples are similar to the full sample.

The most represented industry in the Production RM sample is pharmaceutical products. This may seem peculiar given manufacturing industries should be primarily responsible for the abnormal production costs due to COGS manipulation. However, overproduction is a proxy for both COGS manipulation and sales manipulation, and it may be the case that non-manufacturing firms are more aggressive at offering price discounts (sales manipulation) than manufacturing firms. For example, in August 2004, Bristol-Myers, a large pharmaceutical manufacturer, agreed to pay $150 million to settle SEC charges of accounting fraud, largely stemming from "channel stuffing", or enticing wholesalers to buy excess inventory.[12]

6. Results

6.1 Operating performance after real earnings management

The operating performance of firms that engage in RM is tested separately for each sample: R&D RM, SG&A RM, Asset RM and Production RM (Hypothesis 1). Two methods are employed. First, in an effort to control for both performance and accruals manipulation, I adopt a matched sample technique. For every RM firm, a control firm matched on operating performance, industry and accruals decile in year t is identified. Next, I compare performance in the subsequent three years. Finally, future ROA is modeled as a function of current ROA, an indicator variable for RM, an interaction variable between RM and ROA and several control variables.

6.1.1 Operating performance - univariate analysis

In this section changes in operating performance are examined in the subsequent three years between the RM firms and a matched control firms. In this setting, I attempt to control for three main issues that may influence future firm performance: the level of accounting accruals, the mean reversion in accounting data, and industry membership.

Two measures are used to capture operating performance: return on assets and cash flow from assets. Return on assets (ROA) is defined as earnings before extraordinary items divided by average total assets. This measure is commonly used in the accounting literature. The costs of RM include the possibility that cash flows in future periods are affected negatively by the actions taken during this period to increase earnings. Therefore, the second accounting performance measure is cash flow from operations on assets (CFO).

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[12]The Wall Street Journal, August 5, 2004, "Bristol-Myers Settles SEC Fraud Case" by Barbara Martinez.

Extensive accounting research documents that firms with high accruals are more likely to experience future earnings problems. Therefore, to ensure the results are robust to the accrual anomaly, I match on accruals decile in year t. Next, to control for the underlying economic factors as well as the mean reversion in accounting data, Barber and Lyon (1997) suggest that past performance adjusts for these effects. Many studies match on size, but doing so assumes that operating performance varies by size (Fama and French, 1997) and Barber and Lyon (1997) suggest that size is not essential for detecting abnormal operating performance. Kothari et al. (2002) contend that performance matching is useful when variables of interest are correlated with performance. They suggest that performance matching is critical to designing well-specified tests of earnings management. Finally, the RM firms are matched on industry membership to control for any industry wide shocks and conservative accounting inherent in the industry.

Each RM firm is matched with a non-RM firm by year, industry and performance. Since the analysis examines four different types of RM, I construct a control sample for each separate RM sample. I require that the operating performance (ROA or CFO) in year t be within 90–110% of the operating performance of the RM firm and in the same accruals decile and same four digit SIC. If no firm is within this confidence interval, the process is repeated but increase the sample of potential matches by identify all firms in the same accruals decile in a similar three digit SIC. If this does not produce a match I identify all firms with a similar two digit SIC then if necessary by one digit SIC. If a match still cannot be found, I match performance within the designated threshold without regard to SIC. In all cases, the control firm is in the same accruals decile, and within 90–110% of the RM firm.[13] The majority of matches are made at the 2 digit and 3 digit SIC level.

[13] In some cases, the matching procedure does not identify a control firm, because there is no other firm within the 90% to 110% performance threshold and in the same accruals decile. Therefore, I remove these RM firms from the analysis. As a robustness check, instead of removing these RM firms from the analysis, I identify a control firm closest in performance without regard to the 90% to 110% performance criteria. The results are qualitatively similar.

The abnormal performance in the subsequent three years is equal to the difference between the performance of the RM firm and the contemporaneous performance of its match control firm as follows:

$$\text{Abnormal ROA}_{j,t} = \text{ROA}_{i,t} - \text{Matched ROA}_{i,t} \qquad (5)$$

$$\text{Abnormal CFO}_{j,t} = \text{CFO}_{i,t} - \text{Matched CFO}_{i,t} \qquad (6)$$

Table 4 presents the univariate analysis. Panel A reports abnormal operating performance for the R&D RM sample. In year t, the matching year, abnormal operating performance is not significantly different from zero which one would expect given the performance matching criteria. Consistent with R&D RM having an economically significant consequence, operating performance (both means and medians) is lower in each of the subsequent three years. Mean (median) abnormal ROA is 1.15% (4.19%) lower in the subsequent year for firms that engaged in myopic investment in R&D. The evidence is consistent R&D RM having a significantly negative impact on both earnings and cash flows.

Panel B reports abnormal operating performance for the SG&A RM sample. Abnormal ROA in the subsequent three years is significantly negative for the SG&A RM firm-years. The biggest impact on both ROA and CFO occurs in t+1. Although CFO is lower for SG&A RM firm-years, it is not significantly lower in any of the subsequent three years. The results indicate that SG&A RM is negatively related to future earnings but no significant cash flow effect, compared to the matched sample.

Panel C presents the results for the Asset RM sample, abnormal ROA and CFO is negative in the subsequent three years. Median abnormal ROA is significantly negative in year t+2 and t+3. Median CFO is significantly negative in year t+1 and t+2. The results suggest that Asset RM has a negative impact on cash flows immediately, but return on assets is not affected until later. One interpretation could be that the firm no longer has to report depreciation expense associated with the strategically sold asset, therefore earnings are not significantly lower in year t+1. However, the foregone future cash flows associated with Asset RM are apparent immediately.

Panel D reports abnormal operating performance for the Production RM sample. Abnormal ROA in the subsequent three years is significantly negative, whereas abnormal CFO is only significantly negative in year t+1. Mean (median) abnormal ROA is 3.26% (1.27%) lower in the subsequent year for firms that engaged in production RM and mean (median) abnormal CFO is 1.79% (1.46%) lower in the subsequent year. The evidence is consistent R&D RM having a significantly negative impact on both earnings and cash flows.

Table 5 reports the results for abnormal changes in operating performance after RM. All types of RM, except Asset RM, appear to be associated with lower changes in ROA in year t+1, evening after controlling for the accrual anomaly and industry membership. However, in year t+2 and t+3 both the changes in ROA and CFO of RM firm-years are not distinguishable from the matched sample (except for abnormal change in CFO for Asset RM firms is significantly positive in year t+3). Taken together, the findings reported in Table 4 and Table 5 support the hypothesis that RM has an economically significant impact on subsequent operating performance. Specifically, all four types of RM activities are associated with lower future performance compared to non-RM firms matched on performance, accruals and industry.

5.1.2 Operating performance – multivariate analysis

There may be other factors (besides industry, accruals decile and performance) that influence future operating performance. In an effort to check the robustness of the results to alternative explanations, I add additional control variables that may influence operating performance.[14] In this section, the regression controls for performance, size effects, growth opportunities, the life cycle of the firm and performance. ROA in year t+2 is also examined, because the future performance effects of RM are likely to take some time to impact future ROA.

$$ROA_{t+i} = \gamma_0 + \gamma_1 LOGASSET_t + \gamma_2 BTM_t + + \gamma_3 ROA_t + \gamma_4 RETURN_t + \gamma_5 PORTACC_t + \gamma_6 I\_RMnt + \gamma_7 I\_RMn_t {*} ROA_t + \varepsilon_{t+1} \quad (7)$$

[14]This model is based on Bens et al. (2002) who examine the real cost of awarding employee stock options. The model is augmented to control for accruals and RM.

Where: i = 1 to 2
n = 1 to 4

ROA	= return on assets in year t
LOGASSET	= the natural logarithm of total assets
BTM	= the book value of equity divided by the market value of equity
RETURN	= the one year holding period return on an investment in firm j's common stock
PORTACC	= the portfolio ranking of accruals, converted to a [0,1] scale

In this section, model (7) is estimated on the reduced sample of firm-years in the high net operating asset quintile in an effort to control for any bias potentially induced by identifying RM firm-years based on high net operating assets. Running the regression on the reduced sample ensures the results are robust to any potential bias due to high net operating assets[15].

I include past ROA to control for the time series properties and performance of return on assets. LOGASSET controls for any size effects. BTM controls for growth opportunities and/or the life cycle of the firm. In the context of R&D, SG&A and Asset RM, controlling for the life cycle is important, given the "maturity hypothesis" which predicts that as firms mature, they experience a decline in their investment opportunity set. I also include RETURN to control for the association between stock performance and future earnings. Kothari and Sloan (1992) show that current stock prices predict future earnings positively. Finally, PORTACC controls for the accrual anomaly documented by Sloan (1996).

The coefficient estimates for model (7) are presented in Table 6 and 7. The control variables, current ROA and RETURN, are significant and with the predicted sign. With the exception of the R&D RM model, BTM is significantly negative. The coefficient estimate on PORTACC is significantly negative in every model consistent with the evidence that higher levels of accruals contribute negatively to future ROA.

Even after controlling for the time-series property of ROA, size effects, growth opportunities, and performance, identifying R&D, SG&A and production RM are incrementally informative at explaining future ROA. However, the interaction term, representing the

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[15]Qualitatively similar results are obtained when estimating model (7) using the full sample.

persistence of ROA, is significantly positive for R&D RM firm-years. The persistent of ROA for the Asset and Production RM sample is significantly negative.

Since it may be the case that future performance effects of RM take longer than one period to materialize, I estimate model (7), using ROA_{t+2} as the independent variable, to assess the impact of ROA on two years ahead ROA. The persistence of ROA on two years ahead ROA for the R&D RM sample is negative but not significant, however, the mean effect is significantly negative. Although SG&A RM firms have worse future firm performance, represented by the I_RM2 indicator variable, the persistence of ROA is significantly positive for ROA_{t+1}. Overall the results of the multivariate analysis suggests that identifying all four types of RM are incrementally informative about future earnings, even after controlling for information in past earnings and several control variables.

6.2 Does the stock market recognize real earnings management – Mishkin Test

Following Mishkin (1983) and Sloan (1996), I test whether the stock market is efficient in impounding the information contained in RM for future earnings. First, I estimate the relation between RM and future earnings. Since the univariate results reveal that, at least partially, the performance consequences of RM materialize in the subsequent year, the analysis focuses on year t+1. Second, the relation between RM and future earnings implicit in security prices is estimated. A comparison of these historical and market-inferred weights using the Mishkin test indicates whether investors correctly identify RM and its importance for future earnings. The earnings forecasting equation in Sloan (1996) is extended to incorporate the implications of RM for future earnings as follows:

$$EARN_{t+1}=\omega_0 + \omega_{1a}CFO_t + \omega_{1b}ACC_t + \omega_2 I\_RMn_t + \omega_{2a}CFO_t{*}I\_RMn_t + \omega_{2b}ACC_t{*}I\_RMn_t + \varepsilon_{t+1} \quad (8)$$

$$SAR_{t+1} = \beta_0 + \beta_1 (EARN_{t+1} - \omega_0 - \omega^*_{1a} CFO_t - \omega^*_{1b} ACC_t - \omega_2 I\_RMn_t - \omega_{2a}CFO_t{*}I\_RMn_t - \omega_{2b}ACC_t{*}I\_RMn_t) + \nu_{t+1} \quad (9)$$

The RM group is compared to the rest of the sample, therefore RM takes the value of 1 if the firm engaged in RM and the value of 0 otherwise.[16] Equation (8) is the forecasting equation; the coefficient ω_{1a} and ω_{1b} captures the persistence of cash flows and accruals, respectively, while ω_{2a} (ω_{2b}) captures the differential persistence factor for cash flow (accruals) between the RM firm-years and the rest of the sample. Equation (9) assumes that the market reacts to unexpected earnings conditioned on last year's earnings and estimates the weights that the market assigns to the earning components in forecasting future earnings. Comparing coefficients across equations tests whether the market prices cash flows and accrued earnings efficiently in either the non-RM or the RM group.

The equations are estimated jointly using an iterative generalized nonlinear least squared estimation. The system is run twice. First, the system is run with no constraints. Second, to test whether the weight on the earnings components is the same between the forecasting and pricing equation the system is run again imposing the coefficient constraints being tested. The equality of the coefficients across equation (8) and (9) is tested using a likelihood ratio statistic which is distributed asymptotically chi-square (q):

$2*n*Ln(SSR^c/SSR^u)$. q is the number of constraints imposed by market efficiency; n is the number of observation in each equation; SSR^c is the sum of squared residuals from the constrained weighted system; and SSR^u is the sum of squared residuals from the unconstrained weighted system.

5.2.1 Results of the Mishkin test

Table 8 reports the results from the Mishkin test. Consistent with Sloan (1996), it appears that investors underestimate the persistence of cash and overestimate the persistence of accruals in each sample. For example, in Panel B, the coefficient on CFO (ACC) in the

[16]I compute the results of the Mishkin test on full sample and the results are qualitatively similar.

forecasting equation is 0.80 (0.66), whereas the coefficient from the pricing equation is 0.69 (0.75).

Testing $\omega_{2a} = \omega^*_{2a}$ ($\omega_{2b} = \omega^*_{2b}$) indicates whether the market recognizes the differential in the persistence of cash flows (accruals) between the RM group and the non-RM group.[17] Panel A of Table 8, reports the results of the Mishkin test for the R&D RM sample. The coefficient on the R&D RM indicator variable is -0.026 indicating that R&D RM firms are associated with lower future earnings, whereas the market perceives the weight to be 0.024. The likelihood ratio statistic indicates that the difference between the forecasting and pricing equation is significantly different (ratio statistic 7.29). The differential persistence factor for cash earnings is 0.010 (not significant), while the market perceives it to be .118 (significant with one tail). The likelihood ratio statistic indicates that the market does not appear to misestimate the persistence in cash of R&D RM. However, the difference is significant using a one tail test. Similarly, the market efficiently prices the accrual component of R&D RM firms. Taken together, it appears the market overestimates the contribution of R&D RM firm-years to future earnings. However, the market correctly prices the persistence of the cash and accruals components of these earnings.

Panel B of Table 8, reports the results of the Mishkin test for the SG&A RM sample. The differential persistence factor for cash earnings is insignificant and zero, however, the market perceives it to be 0.152 (with a significant likelihood ratio of 5.97). The differential persistence factor for accrued earnings is –0.05, while the market perceives it to be –0.05, not statistically different. It appears the market overestimates the persistence in cash flows associated with SG&A RM firm-years, although the market does recognize the lower persistence of accruals and the lower future earnings for these firm-years.

Panel C of Table 8, reports the results of the Mishkin test for the Asset RM sample. It appears the differential persistence factor for both cash and earnings is equal across the

[17] Since the interest is whether investors recognize the differential in the persistence of cash flows and accruals between the two groups, I just report the likelihood ratio statistic for that test.

forecasting and pricing equation. The indicator variable for Asset RM firm-years is significantly negative in the forecasting equation but significantly positive in the pricing equation. It appears the market assigns a higher weight to Asset RM firms than is justified given the relationship between Asset RM firms and future earnings (with a significant likelihood ratio statistic of 7.46). Overall, it appears the market recognizes the persistence in accruals and cash flows associated with Asset RM but not the mean effect.

Panel D of Table 8, reports the results of the Mishkin test for the Production RM sample. The differential persistence factor for cash earnings is positive, 0.075, while the market perceives it to be 0.170 (with an insignificant, two-tailed, likelihood ratio of 2.07). The differential persistence factor for accrued earnings is –.169, while the market perceives it to be –0.376 (with a significant likelihood ratio of 3.62). Interestingly, the results indicate that the market underestimates the persistence in accruals for the Production RM firms. Overall, the Mishkin test indicates that the market overestimates the one-period ahead earnings of Production RM firm-years and the persistence of cash flows (although only significant two-tailed). However, the market underestimates the persistence in accruals.

5.3 Additional tests

5.3.1 Future returns and real earnings management

The preceding section used the Mishkin test to demonstrate whether the stock market prices information about RM. The coefficients are estimated from a set of contemporaneous observations (throughout the sample period), hence the procedure suffers from a "foresight" bias. Because the models use future information the market did not have when setting prices, these regressions do not provide a valid test of market efficiency.[18] As a result, I will provide additional tests in an effort to mitigate these potential biases. I estimate the following cross-sectional OLS regression for each of the 13 years in the sample:

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[18]See Beaver and McNichols (2001); Kraft, Leone and Wasley (2004) provide a detailed discussion of the research design issues associated with the Mishkin test.

$$SIZE_{t+1} = \gamma_0 + \gamma_1 I\_RMn_t + \gamma_2 SIZE_t^{dec} + \gamma_3 BETA_t^{dec} + \gamma_4 LnBM_t^{dec} + \gamma_5 EP_t^{dec} + \gamma_6 ACC_t^{dec} \quad (11)$$

Where: n = 1,2,3,4

The dependent variables are one-year ahead size adjusted returns. Equation (11) includes a variety of control variables used in accounting and finance literature as proxies for risk factors that predict stock returns. Research shows that future abnormal returns are associated with SIZE, book-to-market (BTM), and systematic risk (BETA). Additionally, the earnings-to-price ratio (EP) is included to control for the earnings-price anomaly and accruals (ACC) to capture the accrual anomaly documented by Sloan (1996).[19]

Following Fama and MacBeth (1973), equation (11) is run annually. The coefficient estimates reported are the means of the time-series coefficients. To address outliers and so that the coefficients can be interpreted as returns to a zero investment hedge portfolio, the control variable are ranked by deciles (0,9) each year and the decile number is divided by nine so each observation takes the value ranging between zero and one (Rajgopal et al., 2003). The t-statistics are based on the time-series standard errors of the estimated coefficients.

Results reported in Table 9 indicate that incremental abnormal returns related to R&D RM (Panel A) and Asset RM (Panel D) persist after controlling for the Fama–French factors and the accrual anomaly. There is a negative relation between R&D and Asset RM and future returns that is statistically significant. R&D RM firm-years are associated with incremental returns of 7.1%. Similarly, Asset RM firm-years are associated with incremental returns of 8.1%. The negative sign on the coefficients is consistent with the difference in historical and security-market weightings of the contribution of RM to future earnings documents using the Mishkin framework.

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[19]To address potential concerns about industry membership on future returns, particularly high tech industries, I conduct the following two sensitivity tests. First, I run the regression including controls for industries with more than 100 firms (based on the Fama-French 48 industries). Second, I include an indicator variable for whether the firm is classified as a new economy firm, using the classification in Murphy (2003). Unreported results indicate the results are robust to these additional controls.

Table 9, also, reports a negative association between SG&A RM (Panel B) and Production RM (Panel D) and future returns. The incremental returns associated with SG&A RM are negative for nine out of the 13 years. Additionally, incremental returns associated with Production RM are negative for eight out of the 13 years. However, after controlling for the Fama–French factors and the accrual anomaly the incremental returns are not statistically significant. Therefore, identifying SG&A and Production RM does not appear to be informative in explaining future returns.

5.3.2 Analyst forecasts

The primary finding is that RM results in an economically significant decline in operating performance. In this section, I investigate whether the poor earnings performance of RM firms are a surprise to analysts. Using data provided by I/B/E/S, the forecast error is equal to actual realized earnings per share minus the mean of the analysts' forecasts. To control for industry-wide surprises and bias in analysts' forecasts, I compute the earnings forecast error on a matched sample using the same criteria as the univariate analysis (performance, industry and accruals decile). The abnormal analyst forecast error is the RM firm's forecast error minus the contemporaneous forecast error for its matched control firm.

Table 10 presents the results. In general, the results reveal that the analysts' forecast errors for all four types of RM are not statistically different from the control firms. Although unreported results reveal that forecast errors for the RM sample are significantly negative implying that analysts are overly optimistic for the RM firms, the abnormal forecast error is not significantly different from zero for any type of RM.

It appears analysts recognize the future earnings implications of all four types of RM. This is consistent with the recommendations of financial statement analysis texts that encourage analysts be attentive to expenditures on R&D, marketing and distribution activities and the firms overall competitive strategy and to closely examine potential red flags such as realized gains from asset sales (Palepu, Healy and Bernard, 2004).

6. Conclusion

This paper contributes to the body of literature examining the resource allocation effects of earnings management. Four types of real earnings management activities are examined: (1) cut discretionary investment of R&D to decrease expense, (2) cut discretionary investment of SG&A to decrease expense, (3) sell fixed assets to report gains, and (4) cut prices or extend more lenient credit terms to boost sales and/or overproduce to decrease COGS expense. Next, I assess: (i) the extent to which real earnings management affects subsequent operating performance (as measured by both earnings and cash flows), and (ii) whether investors and analysts expect the subsequent decline in performance.

The analysis illustrates that real earnings management has an economically significant impact on subsequent operating performance. Specifically, all four types of real earnings management activities are associated with lower return on assets compared to non-RM firms after controlling for size, performance, accruals, and industry. Except for myopic investment in SG&A, the other three types of RM are associated with significantly lower future cash flow scaled by assets. The regression results indicate that all four types of real earnings management are associated with lower ROA in the subsequent year controlling for past performance, size, growth, and accruals decile. In addition, the persistence of ROA is significantly lower for Asset and Production RM firm-years. The analysis suggests that, overall, identifying all four types of RM is incrementally informative about future earnings and cash flows.

Given the empirical results that all four types of real earnings management activities negatively impact future operating performance, I turn my attention the question of whether investors and analysts recognize the consequences of real earnings management. The analysis provides evidence that investors' expectations, as reflected in stock prices, do not recognize the consequences of myopic R&D investment and the strategic timing of asset sales but the evidence is inconsistent with investors not understanding the implications of myopic investment in SG&A and cutting prices and/or overproducing to increase current period income. Analysts' expectation, as reflected in forecasts of earnings, appear to incorporate information about all four types of real earnings management.

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Table 1

Mean and Median Prior Cumulative Abnormal Accruals across Quintiles of Net Operating Assets.

Sample consists of 32,402 firm-years from 1988-2000. Replication of Barton and Simko (2002), shows that firms with higher net operating assets (NOA) are associated with higher levels of previous accruals management. NOA is net operating assets (i.e. shareholders' equity less cash and marketable securities, plus total debt) at the beginning of year t, scaled by sales for year t-1. Abnormal accruals are estimated for firm i in year t using the residual from the Jones (1991) model, estimated by two-digit SIC code. Abnormal accruals are implicitly scaled by lagged total assets, therefore before accumulating abnormal accruals back in time, they are unscaled by multiplying the regression residuals by the corresponding lagged total assets. To avoid inducing a spurious correlation between NOA and prior cumulative abnormal accruals, abnormal accruals are scaled by lagged sales, the same deflator in NOA.

	Quintiles of NOA (at the beginning of the year) by year and industry					Difference between Quintile 5 and 1 (p-value)
	1 (lowest)	2	3	4	5 (highest)	
Panel A: Mean Abnormal Accruals						
Accumulation Period (years):						
[t-1 , t]	-0.09	-0.04	0.00	-0.04	-0.01	0.07
[t-2 , t]	-0.15	-0.09	-0.02	-0.05	-0.04	0.01
[t-3 , t]	-0.22	-0.12	-0.03	-0.09	-0.06	0.16
[t-4 , t]	-0.26	-0.17	-0.06	-0.12	-0.08	0.18
[t-5 , t]	-0.32	-0.21	-0.07	-0.13	-0.13	0.20
Panel B: Median Abnormal Accruals						
Accumulation Period (years):						
[t-1 , t]	-0.010	-0.003	0.001	0.007	0.014	0.04
[t-2 , t]	-0.020	-0.007	0.002	0.010	0.024	0.06
[t-3 , t]	-0.029	-0.012	0.003	0.013	0.030	0.08
[t-4 , t]	-0.037	-0.013	0.002	0.016	0.033	0.09
[t-5 , t]	-0.047	-0.015	0.005	0.017	0.035	0.09

The variables are defined as follows:
NOA = net operating assets (shareholders' equity less cash and marketable securities), plus total debt divided by lagged assets
Mean/Median Abnormal Accruals estimated using the following the modified Jones model:

$$\frac{ACC_t}{A_{t-1}} = \alpha_0 \frac{1}{A_{t-1}} + \beta_1 \frac{\Delta REV_t - \Delta REC_t}{A_{t-1}} + \beta_2 \frac{PPE_t}{A_{t-1}} + \varepsilon$$

ACC = income before extraordinary items less net cash flows from operating activities divided by lagged total assets
A = total assets
ΔREV = change in sales
ΔREC = change in total receivables
PPE = property plant and equipment

Table 2

Identification of RM Firm-Years

Frequency of firms by year t abnormal RM quintile measure and year t-1 net operating asset (NOA) quintile. Total sample 32,484 firm-years from 1988 to 2000. NOA is net operating assets (i.e. shareholders' equity less cash and marketable securities, plus total debt) at the beginning of year t, scaled by sales for year t-1. R&D RM firm-years are those in the lowest abnormal R&D expense quintile and the highest NOA quintile. SG&A RM firm-years are those in the lowest abnormal SG&A expense quintile and the highest NOA quintile. Asset RM firm-years are those in the highest abnormal gain on sale of fixed asset quintile and the highest NOA quintile. Production RM firm-years are those in the highest abnormal production cost quintile and highest NOA quintile.

Panel A: Frequency by Quintile of Abnormal R&D$_t$ and Quintile of NOA$_{t-1}$

		Number of Firms by NOA Quintile in year t-1					Descriptive Statistics	
Abnormal R&D Quintile	Mean Abnormal R&D	1	2	3	4	5	Accruals	NOA$_{t-1}$
1 (highest)	0.15	980	837	739	649	661	-0.078	0.984
2	0.01	798	844	862	774	598	-0.042	0.681
3	0.00	691	871	803	837	675	-0.040	0.715
4	-0.03	643	782	872	851	728	-0.034	0.797
5 (lowest)	-0.13	674	710	743	768	976	-0.038	1.422

Panel B: Frequency by Quintile of Abnormal SG&A$_t$ and Quintile of NOA$_{t-1}$

		Number of Firms by NOA Quintile in year t-1						
Abnormal SG&A Quintile	Mean Abnormal SG&A	1	2	3	4	5	Accruals	NOA$_{t-1}$
1 (highest)	0.25	939	884	951	1,056	1,120	-0.054	1.083
2	0.05	932	1,056	1,061	1,134	777	-0.039	0.748
3	0.00	977	1,115	1,129	1,018	717	-0.035	0.683
4	-0.06	981	1,171	1,101	944	763	-0.039	0.729
5 (lowest)	-0.24	1,059	996	912	904	1,080	-0.047	1.149

Panel C: Frequency by Quintile of Abnormal Gain on Asset Sales$_t$ and Quintile of NOA$_{t-1}$

		Number of Firms by NOA Quintile in year t-1						
Abnormal Gain on Asset Sale Quintile	Mean Abnormal Gain on Asset Sales	1	2	3	4	5	Accruals	NOA$_{t-1}$
1 (lowest)	-0.41	854	905	895	968	793	-0.061	0.960
2	-0.08	826	969	957	922	752	-0.050	0.875
3	-0.03	871	964	968	860	765	-0.044	0.909
4	0.01	869	864	880	897	916	-0.036	1.029
5 (highest)	0.45	805	786	813	866	1,150	-0.040	1.258

Table 2 (cont.)

Identification of RM Firm-Years

Panel D: Frequency by Quintile of Abnormal Production Costs$_t$ and Quintile of NOA$_{t-1}$

Abnormal Production Cost Quintile	Mean Abnormal Production Costs	Number of Firms by NOA Quintile in year t-1					Descriptive Statistics	
		1	2	3	4	5	Accruals	NOA$_{t-1}$
1 (lowest)	-0.45	1,225	1,339	1,314	1,251	890	-0.032	0.661
2	-0.15	874	1,143	1,329	1,372	1,308	-0.042	0.996
3	-0.04	806	1,087	1,251	1,387	1,500	-0.048	1.211
4	0.06	1,054	1,279	1,185	1,268	1,240	-0.050	0.998
5 (highest)	0.38	1,961	1,303	1,041	820	898	-0.058	1.083

The variables are defined as follows:

Accruals = income before extraordinary items less net cash flows from operating activities divided by average total assets

NOA = beginning balance of net operating assets (shareholders' equity less cash and marketable securities, plus total debt)

Estimation Models to Calculate Abnormal Level of R&D, SG&A, Gain on Asset Sale and Production Costs:

1. Abnormal R&D is the residual from the following model estimated by year and industry:

$$\frac{RD_t}{A_{t-1}} = \alpha_0 + \beta_1 \frac{RD_{t-1}}{A_{t-2}} + \beta_2 INT_t + \beta_3 Q_t + \beta_4 CX_t + \beta_5 MV_t + \varepsilon$$

2. Abnormal SG&A is the residual from the following model estimated by year:

$$\log(\frac{SGA_t}{SGA_{t-1}}) = \alpha_0 + \beta_1 \log(\frac{S_t}{S_{t-1}}) + \beta_2 \log(\frac{S_t}{S_{t-1}}) * DD_t + \beta_3 \log(\frac{S_{t-1}}{S_{t-2}}) + \beta_4 \log(\frac{S_{t-1}}{S_{t-2}}) * DD_{t-1} + \varepsilon$$

3. Abnormal Gain on Asset Sales is the difference between the actual gain minus the industry year median

$$GainA_t = \alpha_0 + \beta_1 ASales_t + \beta_2 ISales_t + \beta_3 \log(S)_t + \beta_4 \%\Delta S_t$$

4. Abnormal Production Costs is the residual from the following model estimated by year and industry:

$$\frac{PROD_t}{A_{t-1}} = \alpha_0 \frac{1}{A_{t-1}} + \beta_1 \frac{S_t}{A_{t-1}} + \beta_2 \frac{\Delta S_t}{A_{t-1}} + \beta_3 \frac{\Delta S_{t-1}}{A_{t-1}} + \varepsilon$$

RD = research and development expense

A = total assets

INT = internal funds (income before extraordinary items plus research and development expense plus depreciation and amortortization) divided by total assets

Q = tobin's Q (market value of equity plus preferred stock plus long term debt plus debt in current liabilities) divided by assets

CX = capital expenditure divided by assets

MV = log of the market value of equity

SGA = selling, general and administrative expense and advertising plus advertising expense

S = total sales

DD = indicator variable equal to 1 when sales decreases between t-1 and t, zero otherwise

ASales =long-lived assets sales divided by the market value at the beginning of the year

ISales = Long-lived investment sales / market value at the beginning of the year [data109/(#199*#25)]

PROD = COGS + ΔINV

COGS = cost of goods sold expense

ΔINV = inventory increase/decrease

Table 3

Descriptive Statistics

Firm-years from 1988-2000. The full sample consists of all firm-years (excluding the RM firm-years). The real earnings management sample consists of all firm-years identified as having engaged in one or more types of RM. Of the 3,129 RM firm-years: 2,280, 730, 112 and 7 engage in one, two, three and four types of RM, respectively. NOA is net operating assets (i.e. shareholders' equity less cash and marketable securities, plus total debt) at the beginning of year t, scaled by sales for year t-1. R&D RM firm-years are those in the lowest abnormal R&D expense quintile and the highest NOA quintile. SG&A RM firm-years are those in the lowest abnormal SG&A expense quintile and the highest NOA quintile. Asset RM firm-years are those in the highest abnormal gain on sale of fixed asset quintile and the highest NOA quintile. Production RM firm-years are those in the highest abnormal production cost quintile and highest NOA quintile.

Variable	Mean	Std.dev.	Median	1st quartile	3rd quartile
Full Sample (excluding RM firm-years, n=29,355)					
TA	1,331	8,282	135	42	561
TS	1,407	6,278	160	43	668
MV	1,808	11,335	143	39	664
ROA	0.02	0.17	0.05	0.00	0.10
CFO	0.06	0.16	0.06	0.02	0.14
ACC	-0.05	0.12	-0.04	-0.09	0.01
SAR_{t+1}	0.05	0.63	-0.06	-0.34	0.26
RM Sample (n=3,129)					
TA	1,243	7,778	74	24	285
TS	772	4,949	44	10	186
MV	902	4,346	98	32	353
ROA	-0.10	0.27	0.01	-0.18	0.06
CFO	-0.04	0.22	0.02	-0.10	0.09
ACC	-0.06	0.16	-0.04	-0.11	0.01
SAR_{t+1}	0.00	0.71	0.00	-0.45	0.22

The variables are defined as follows:

TA	= total assets in millions
TS	= total sales in millions
MV	= market value of equity in millions
ROA	= income before extraordinary items divided by total assets
CFO	= cash flows from operations divided by total assets
ACC	= income before extraordinary items minus cash flows from operations divided by average total assets
SAR	= size adjusted abnormal returns computed as the buy and hold raw retun minus the buy and hold return on a size matched decile portfolio of firms cumulated over 12 months beginning with the fourth month after the end of fiscal year t.

Table 3 (cont.)

Descriptive Statistics

RM Samples categorized by industry. Firms are assigned to 48 industries based on the classification system developed by Fama and French (1997). NOA is net operating assets (i.e. shareholders' equity less cash and marketable securities, plus total debt) at the beginning of year t, scaled by sales for year t-1. R&D RM firm-years are those in the lowest abnormal R&D expense quintile and the highest NOA quintile. SG&A RM firm-years are those in the lowest abnormal SG&A expense quintile and the highest NOA quintile. Asset RM firm-years are those in the highest abnormal gain on sale of fixed asset quintile and the highest NOA quintile. Production RM firm-years are those in the highest abnormal production cost quintile and highest NOA quintile.

Industry	Full Sample	R&D RM firms	SG&A RM firms	Assets RM firms	Production RM firms
Business Services	4,266	224	154	136	133
Electronic Equipment	2,663	136	106	88	46
Retail	2,189	7	61	106	37
Pharmaceutical Products	2,016	202	27	40	230
Computers	1,925	141	82	73	56
Petroleum and Natural Gas	1,685		93	82	30
Medical Equipment	1,542	133	65	27	56
Wholesale	1,525	4	60	44	24
Machinery	1,488	28	41	60	39
Measuring and Control Equip.	1,125	76	46	41	39
Construction Materials	912	1	35	41	9
Chemicals	868	5	24	38	20
Consumer Goods	764	1	32	21	27
Electrical Equipment	693	13	25	42	16
Other	8,823	5	229	311	136
Total	32,484	976	1,080	1,150	898

Table 4

Abnormal Operating Performance for RM Firms in the Subsequent Three Years

Firm-years suspected of RM are matched to control firms by industry membership, accruals decile and performance (within 10%). NOA is net operating assets (i.e. shareholders' equity less cash and marketable securities, plus total debt) at the beginning of year t, scaled by sales for year t-1. Panel A contains firm-years for which firms are suspected of R&D RM (lowest abnormal R&D expense quintile and highest NOA quintile). Panel B contains firm-years for which firms are suspected of SG&A RM (lowest abnormal SG&A expense quintile and highest NOA quintile). Panel C contains firm-years for which firms are suspected of Asset RM (highest gain on sale of fixed asset quintile and highest NOA quintile). Panel D contains firm-years for which firms are suspected of Production RM (highest production cost quintile and highest NOA quintile).

$$\text{Abnormal ROA}_{i,t} = \text{ROA}_{i,t} - \text{Matched ROA}_{i,t} \quad (5)$$

$$\text{Abnormal CFO}_{i,t} = \text{CFO}_{i,t} - \text{Matched CFO}_{i,t} \quad (6)$$

			Abnormal Operating Performance (%)		p-value for Difference	
		N	Mean	Median	Mean	Median
Panel A: R&D RM						
ROA	t	851	-0.06	0.00	0.15	0.38
	t+1	851	-4.19***	-1.15***	0.00	0.00
	t+2	791	-3.64***	-1.53***	0.00	0.00
	t+3	734	-1.44	-0.65*	0.19	0.08
CFO	t	834	-0.02	0.00	0.57	0.66
	t+1	834	-1.43**	-1.47***	0.03	0.01
	t+2	778	-1.58**	-1.12	0.05	0.11
	t+3	725	-1.08	-1.23*	0.21	0.10
Panel B: SG&A RM						
ROA	t	964	-0.01	0.00	0.79	0.46
	t+1	964	-1.96***	-0.31**	0.01	0.03
	t+2	909	-2.03***	-1.02***	0.01	0.00
	t+3	846	-2.59***	-0.22**	0.01	0.05
CFO	t	951	-0.01	0.01	0.75	0.42
	t+1	949	-0.09	-0.44	0.87	0.32
	t+2	888	-0.59	-1.01	0.35	0.20
	t+3	830	-0.53	-0.22	0.47	0.50
Panel C: Asset RM						
ROA	t	1021	-0.03	0.00	0.37	0.83
	t+1	1021	-0.57	-0.20	0.44	0.20
	t+2	966	-1.23	-0.32*	0.11	0.06
	t+3	910	-1.70*	-0.36**	0.06	0.05
CFO	t	1006	-0.01	0.00	0.69	0.99
	t+1	1005	-0.73	-0.63***	0.18	0.02
	t+2	954	-0.75	-1.09*	0.21	0.10
	t+3	899	-0.15	-0.05	0.84	0.53
Panel D: Production RM						
ROA	t	763	-0.03	0.00	0.61	0.33
	t+1	763	-3.26***	-1.27***	0.00	0.00
	t+2	723	-3.76***	-2.49***	0.00	0.00
	t+3	684	-2.67**	-1.91***	0.03	0.00
CFO	t	722	-0.10*	-0.01*	0.06	0.10
	t+1	722	-1.79**	-1.46***	0.03	0.01
	t+2	683	-1.44	-0.92	0.14	0.16
	t+3	647	-0.03	-0.80	0.98	0.41

Table 5

Abnormal Change in Operating Performance for RM Firms in the Subsequent Three Years

Firm-years suspected of RM are matched to control firms by industry membership, accruals decile and performance (within 10%). NOA is net operating assets (i.e. shareholders' equity less cash and marketable securities, plus total debt) at the beginning of year t, scaled by sales for year t-1. Panel A contains firm-years for which firms are suspected of R&D RM (lowest abnormal R&D expense quintile and highest NOA quintile). Panel B contains firm-years for which firms are suspected of SG&A RM (lowested abnormal SG&A expense quintile and highest NOA quintile). Panel C contains firm-years for which firms are suspected of Asset RM (highest gain on sale of fixed asset quintile and highest NOA quintile). Panel D contains firm-years for which firms are suspected of Production RM (highest production cost quintile and highest NOA quintile).

Abnormal $\Delta ROA_{i,t} = [ROA_{i,t} - ROA_{i,t-1}] - [\text{Matched } ROA_{i,t} - \text{Matched } ROA_{i,t-1}]$
Abnormal $\Delta CFO_{i,t} = [CFO_{i,t} - CFO_{i,t-1}] - [\text{Matched } CFO_{i,t} - \text{Matched } CFO_{i,t-1}]$

			Abnormal Operating Performance (%)		p-value for Difference	
		N	Mean	Median	Mean	Median
Panel A: R&D RM						
ΔROA	t+1	851	-4.12***	-1.37***	0.00	0.00
	t+2	791	0.37	-0.83	0.70	0.46
	t+3	734	1.51	0.15	0.15	0.50
ΔCFO	t+1	834	-1.41**	-1.51***	0.04	0.01
	t+2	778	-0.41	0.57	0.57	0.90
	t+3	725	0.29	-0.25	0.69	0.82
Panel B: SG&A RM						
ΔROA	t+1	964	-1.95***	-0.35**	0.01	0.03
	t+2	909	-0.12	-0.36	0.88	0.36
	t+3	843	-0.26	0.11	0.77	0.72
ΔCFO	t+1	949	-0.08	-0.25	0.88	0.33
	t+2	887	-0.51	-0.25	0.41	0.93
	t+3	826	0.09	0.06	0.89	0.98
Panel C: Asset RM						
ΔROA	t+1	1021	-0.54	-0.25	0.46	0.19
	t+2	966	-0.60	-0.11	0.45	0.55
	t+3	909	-0.14	-0.16	0.87	0.53
ΔCFO	t+1	1005	-0.72	-0.65**	0.18	0.02
	t+2	953	-0.08	-0.25	0.89	0.66
	t+3	899	0.48	0.29	0.45	0.34
Panel D: Production RM						
ΔROA	t+1	763	-3.23***	-1.33***	0.00	0.00
	t+2	723	-0.30	-0.76	0.79	0.38
	t+3	682	1.25	-0.11	0.26	0.73
ΔCFO	t+1	722	-1.69**	-1.33***	0.04	0.01
	t+2	683	0.24	0.06	0.78	0.83
	t+3	645	0.99	0.05	0.29	0.42

Table 6

Cross-Sectional Regressions Relating ROA_{t+1} to RM and Control Variables

Coefficient estimates of ordinary least squares regression relating ROA_{t+1} to an indicator variable for RM firms, an interactive term equal to ROA multiplied by the RM indicator variable and control variables. Past ROA controls for past performance and LOGASSET controls for any size effects. BTM controls for growth opportunities and/or the life cycle of the firm. RETURN controls for the association between stock performance and future earnings. PORTACC is included to control for the accrual anomaly documented by Sloan (1996). Sample consists of firm-years from 1988-2000 in the highest net operating asset quintile.

$ROA_{t+1} = \gamma_0 + \gamma_1 LOGASSET_t + \gamma_2 BTM_t + \gamma_3 ROA_t + \gamma_4 RETURN_t + \gamma_5 PORTACC_t + \gamma_6 I\_RMn_t + \gamma_7 I\_RMn_t * ROA_t + \varepsilon_{t+1}$ (7)
where n = 1,2,3,4

Variable	Pred. Sign	Model 1: R&D INDRM1	Model 2: SG&A INDRM2	Model 3: Asset INDRM3	Model 4: Production INDRM4
Intercept	?	-0.077	-0.046	-0.051	-0.055
		(-6.36)***	(-5.12)***	(-5.47)***	(-6.77)***
LOGASSET	–	0.012	0.006	0.009	0.010
		(7.68)***	(5.24)***	(7.31)***	(8.71)***
BTM	–	0.006	-0.004	-0.004	-0.004
		(1.24)	(-5.25)***	(-4.89)***	(-4.94)***
ROA	+	0.561	0.548	0.639	0.579
		(46.76)***	(47.92)***	(55.11)***	(57.38)***
RETURN	+	0.017	0.023	0.019	0.018
		(6.82)***	(10.85)***	(8.23)***	(8.81)***
PORTACC	–	-0.034	-0.032	-0.054	-0.037
		(-3.42)***	(-4.16)***	(-6.68)***	(-5.19)***
I_RMn	–	-0.044	-0.009	-0.005	-0.058
		(-6.33)***	(-1.62)*	(-0.92)	(-8.92)***
I_RMn * ROA	–	0.025	0.015	-0.027	-0.047
		(2.13)**	(1.20)	(-2.51)**	(-5.59)***
N		3,399	4,112	4,075	5,384
Adj. R^2		55.1%	49.4%	53.8%	53.1%

*/**/*** represent statistical significance at 10%/5%/1% levels two-tailed. t-values in parentheses.
The variables are defined as follows:
ROA = income before extraordinary items divided by total assets
LOGASSET = the natural logarithm of total assets
BTM = the book value of equity divided by the market value of equity
RETURN = the one year holding period return on an investment in the common stock of the firm
PORTACC = the portfolio ranking of accruals divided by total assets, converted to a [0,1] scale, with 0 (1) representing the lowest (highest) level of accruals
I_RM1 = R&D RM: an indicator variable equal to one if the firm is in the lowest abnormal R&D expense quintile and belongs to the highest quintile of beginning balance of NOA
I_RM2 = SG&A RM: an indicator variable equal to one if the firm is in the lowest abnormal SG&A expense quintile and belongs to the highest quintile of beginning balance of NOA
I_RM3 = Asset RM: an indicator variable equal to one if the firm is in the highest abnormal gain on assets sale quintile and belongs to the highest quintile of beginning balance of NOA
I_RM4 = Production RM: an indicator variable equal to one if the firm is in the lowest abnormal production cost quintile and belongs to the highest quintile of beginning balance of NOA

Table 7

Cross-Sectional Regressions Relating ROA_{t+2} to RM and Control Variables

Coefficient estimates of ordinary least squares regression relating ROA_{t+1} to an indicator variable for RM firms, an interactive term equal to ROA multiplied by the RM indicator variable and control variables. Past ROA controls for past performance and LOGASSET controls for any size effects. BTM controls for growth opportunities and/or the life cycle of the firm. RETURN controls for the association between stock performance and future earnings. PORTACC is included to control for the accrual anomaly documented by Sloan (1996). Sample consists of firm-years from 1988-2000 in the highest net operating asset quintile.

$$ROA_{t+2} = \gamma_0 + \gamma_1 LOGASSET_t + \gamma_2 BTM_t + \gamma_3 ROA_t + \gamma_4 RETURN_t + \gamma_5 PORTACC_t + \gamma_6 I\_RMn_t + \gamma_7 I\_RMn_t{*}ROA_t + \varepsilon_{t+1}$$

where n = 1,2,3,4

Variable	Pred. Sign	Model 1: R&D I_RM1	Model 2: SG&A I_RM2	Model 3: Asset I_RM3	Model 4: Production I_RM4
Intercept	?	-0.088	-0.056	-0.058	-0.057
		(-6.64)***	(-5.67)***	(-5.50)***	(-6.40)***
LOGASSET	– / +	0.012	0.008	0.011	0.010
		(7.03)***	(6.12)***	(7.57)***	(8.28)***
BTM	–	0.022	0.000	0.000	0.000
		(4.04)***	(-0.36)	(-0.47)	(-0.11)
ROA	+	0.467	0.397	0.493	0.431
		(35.20)***	(30.96)***	(36.20)***	(38.16)***
RETURN	+	0.017	0.020	0.014	0.017
		(6.17)***	(8.32)***	(5.39)***	(7.59)***
PORTACC	–	-0.035	-0.023	-0.052	-0.038
		(-3.22)***	(-2.75)***	(-5.60)***	(-4.88)***
I_RMn	–	-0.033	-0.012	-0.001	-0.051
		(-4.33)***	(-2.06)**	(-0.08)	(-7.05)***
I_RMn * ROA	–	-0.016	0.045	-0.011	0.011
		(-1.22)	(3.16)***	(-0.74)	(1.23)
N		3,399	4,112	4,075	5,384
Adj. R^2		0.42	0.33	0.37	0.39

***/**/* represent statistical significance at 10%/5%/1% levels two-tailed. t-values in parentheses.
The variables are defined as follows:

ROA = income before extraordinary items divided by total assets
LOGASSET = the natural logarithm of total assets
BTM = the book value of equity divided by the market value of equity
RETURN = the one year holding period return on an investment in the common stock of the firm
PORTACC = the portfolio ranking of accruals divided by total assets, converted to a [0,1] scale, with 0 (1) representing the lowest (highest) level of accruals
I_RM1 = R&D RM: an indicator variable equal to one if the firm is in the lowest abnormal R&D expense quintile and belongs to the highest quintile of beginning balance of NOA
I_RM2 = SG&A RM: an indicator variable equal to one if the firm is in the lowest abnormal SG&A expense quintile and belongs to the highest quintile of beginning balance of NOA
I_RM3 = Asset RM: an indicator variable equal to one if the firm is in the highest abnormal gain on assets sale quintile and belongs to the highest quintile of beginning balance of NOA
I_RM4 = Production RM: an indicator variable equal to one if the firm is in the lowest abnormal production cost quintile and belongs to the highest quintile of beginning balance of NOA

Table 8

The Mishkin Test

Firm-years from 1988-2000. Nonlinear generalized least squares estimates of the market pricing of cash flows and accruals with respect to their implications for one-year ahead earnings. The likelihood ratio statistic tests the equality of coefficients across equation (10) and equation (11).

"Forecasting Equation"

$$EARN_{t+1} = \omega_0 + \omega_{1a}CFO_t + \omega_{1b}ACC_t + \omega_2 I\_RMn_t + \omega_{2a}CFO_t{*}I\_RMn_t + \omega_{2b}ACC_t{*}I\_RMn_t + \varepsilon_{t+1} \quad (8)$$

"Pricing Equation"

$$SAR_{t+1} = \beta_0 + \beta_1 (EARN_{t+1} - \omega_0 - \omega_{1a}^{*}CFO_t - \omega_{1b}^{*}ACC_t + \omega_2^{*}I\_RMn_t - \omega_{2a}^{*}CFO_t{*}I\_RMn_t - \omega_{2b}^{*}ACC_t{*}I\_RMn_t) + \nu_{t+1} \quad (9)$$

		Equation (10)		Equation (11)			
Variable	Pred. Sign	Coefficient	t-statistic	Coefficient	t-statistic	Likelihood ratio statistic	Marginal significance level
Panel A: R&D RM: I_RM1 (n = 19,360)							
Intercept	?	0.002	2.28***	0.058	11.44***		
CFO	+	0.843	179.32***	0.766	36.13***		
ACC	+	0.686	88.43***	0.871	24.68***		
I_RM2	–	-0.026	-6.55***	0.024	1.31	7.29	0.01
CFO * I_RM2	–	0.010	0.61	0.118	1.65*	2.12	0.15
ACC * I_RM2	–	0.097	3.26***	0.115	0.86	0.00	1.00
Panel B: SG&A RM: I_RM2 (n = 24,769)							
Intercept	?	0.009	11.55***	0.031	6.75***		
CFO	+	0.806	170.36***	0.685	36.07***		
ACC	+	0.660	108.78***	0.754	31.29***		
I_RM2	–	-0.008	-2.36**	-0.005	-0.35	0.26	0.61
CFO * I_RM2	–	-0.008	-0.50	0.152	2.39**	5.97	0.01
ACC * I_RM2	–	-0.055	-2.31**	-0.056	-0.59	0.00	1.00
Panel C: Asset RM: I_RM3 (n = 22,105)							
Intercept	?	0.004	5.12***	0.050	10.57***		
CFO	+	0.841	183.31***	0.786	37.97***		
ACC	+	0.686	102.68***	0.853	28.07***		
I_RM3	–	-0.008	-2.39**	0.034	2.28**	7.46	0.01
CFO * I_RM3	–	0.014	0.82	-0.066	-0.88	1.00	0.32
ACC * I_RM3	–	0.062	2.21**	-0.049	-0.39	0.75	0.39
Panel D: Production RM: I_RM4 (n = 30,114)							
Intercept	?	0.006	9.08***	0.042	10.45***		
CFO	+	0.822	208.08***	0.760	42.93***		
ACC	+	0.688	120.98***	0.841	32.71***		
I_RM4	–	-0.021	-4.80***	0.032	1.67*	7.23	0.01
CFO * I_RM4	–	0.075	5.26***	0.170	2.66***	2.07	0.15
ACC * I_RM4	–	-0.169	-7.18***	-0.376	-3.58***	3.62	0.06

*/**/*** represent statistical significance at 10%/5%/1% levels two-tailed.

The variables are defined as follows:

EARN = net income before extraordinary items divided by average total assets

CFO = cash flows from operations divided by total assets

ACC = income before extraordinary items minus cash flows from operations divided by average total assets

I_RM1 = R&D RM: an indicator variable equal to one if the firm is in the lowest abnormal R&D expense quintile and belongs to the highest quintile of beginning balance of NOA

I_RM2 = SG&A RM: an indicator variable equal to one if the firm is in the lowest abnormal SG&A expense quintile and belongs to the highest quintile of beginning balance of NOA

I_RM3 = Asset RM: an indicator variable equal to one if the firm is in the highest abnormal gain on assets sale quintile and belongs to the highest quintile of beginning balance of NOA

I_RM4 = Production RM: an indicator variable equal to one if the firm is in the lowest abnormal production cost quintile and belongs to the highest quintile of beginning balance of NOA

SAR = size adjusted abnormal returns computed as the buy and hold raw retun minus the buy and hold return on a size matched decile portfolio of firms cumulated over 12 months beginning with the fourth month after the end of fiscal year t.

Table 9

Regressions Relating one year ahead Size Adjusted Returns to to RM and Other Risk Factors

Firm-years from 1988-2000. Summary regression statistics of the relation between abnormal size adjusted stock returns and an RM indicator variable after controlling for Fama-French risk factors, EP anomaly and Accruals decile (Fama and Macbeth, 1973 approach).

$$SIZE_{t+1} = \gamma_0 + \gamma_1 I\_RMn_t + \gamma_2 SIZE_t^{dec} + \gamma_3 BETA_t^{dec} + \gamma_4 LnBM_t^{dec} + \gamma_5 EP_t^{dec} + \gamma_6 ACC_t^{dec} \quad (10)$$

Where n = 1,2,3,4

	Intercept	INDREM	$SIZE^{dec}$	$BETA^{dec}$	$LnBM^{dec}$	EP^{dec}	ACC^{dec}
	?	–	–	+	+	+	
Panel A: R&D RM: I_RM1							
Means from Annual Regressions (N=13)	0.159	-0.071	-0.120	0.046	0.056	-0.079	-0.116
	(2.13)*	(-3.03)***	(-1.88)*	(0.49)	(0.65)	(-1.17)	(-6.61)***
Number of years coefficient Positive/Negative	11/2	3/10	2/11	6/7	7/6	6/7	0/13
Panel B: SG&A RM: I_RM2							
Means from Annual Regressions (N=13)	0.103	-0.044	-0.107	0.028	0.064	-0.027	-0.100
	(2.64)**	(-1.66)	(-1.95)*	(0.36)	(0.89)	(-0.55)	(-4.01)***
Number of years coefficient Positive/Negative	10/3	4/9	2/11	7/6	7/6	6/7	1/12
Panel C: Asset RM: I_RM3							
Means from Annual Regressions (N=13)	0.136	-0.081	-0.134	0.018	0.057	-0.052	-0.097
	(2.49)**	(-2.42)**	(-2.34)**	(0.20)	(0.69)	(-0.85)	(-5.64)***
Number of years coefficient Positive/Negative	11/2	4/9	2/11	7/6	9/4	7/6	0/13
Panel D: Production RM: I_RM4							
Means from Annual Regressions (N=13)	0.124	-0.057	-0.133	0.041	0.053	-0.040	-0.114
	(2.59)**	(-1.14)	(-2.22)**	(0.48)	(0.71)	(-0.69)	(-5.32)***
Number of years coefficient Positive/Negative	10/3	5/8	2/11	7/6	9/4	7/6	1/12

*/**/*** represent statistical significance at 10%/5%/1% levels two-tailed.

$SIZE^{dec}$ = the natural logarithm of market value of common equity measured at the beginning of the abnormal return accumulation period, transformed to a scaled-decile variable with values ranging from 0 to 1

$BETA^{dec}$ = systematic risk estimated from regression of monthly raw returns on value weighted portfolio over a 60-month return period prior to the abnormal return accumulation period, transformed to a scaled-decile variable with values ranging from 0 to 1

$LnBM^{dec}$ = the naturnal logarithm of the ratio of the book to market ratio measured at the beginning of the abnormal return accumulation period, transformed ot a scaled-decile variable with values ranging from 0 to 1

EP^{dec} = earnings to price ratio (stock price measured at the beg. of the return accumulation period), transformed to a scaled-decile variable with values ranging from 0 to 1

ACC^{dec} = the portfolio ranking of accruals, converted to a [0,1] scale, with 0 (1) representing the lowest (highest) level of accruals

I_RM1 = R&D RM: an indicator variable equal to one if the firm is in the lowest abnormal R&D expense quintile and belongs to the highest quintile of beginning balance of NOA

I_RM2 = SG&A RM: an indicator variable equal to one if the firm is in the lowest abnormal SG&A expense quintile and belongs to the highest quintile of beginning balance of NOA

I_RM3 = Asset RM: an indicator variable equal to one if the firm is in the highest abnormal gain on assets sale quintile and belongs to the highest quintile of beginning balance of NOA

I_RM4 = Production RM: an indicator variable equal to one if the firm is in the lowest abnormal production cost quintile and belongs to the highest quintile of beginning balance of NOA

SAR = size adjusted abnormal returns computed as the buy and hold raw retun minus the buy and hold return on a size matched decile portfolio of firms cumulated over 12 months beginning with the fourth month after the end of fiscal year t.

Table 10

Abnormal Analyst Earnings Forecast Errors

Mean and median analysts' forecast errors in the three years after the RM year. For each RM firm, the forecast error is equal to actual earnings per share minus the median of analysts' forecasts. Firm-years suspected of RM are matched to control firms by performance, industry membership and accruals decile. The forecast error for each matched control firm is calculated similarly. The abnormal earnings forecast error is the difference between the forecast errors for the RM firm and its matched control firm.

		Abnormal Forecast Error (%)		p-value for Difference	
	N	Mean	Median	Mean	Median
Panel A: R&D RM					
t+1	540	-3.26	0.00	0.14	0.23
t+2	465	4.18*	0.00	0.08	0.74
t+3	360	1.99	0.00	0.45	0.83
Panel B: SG&A RM					
t+1	466	-2.89	0.00	0.22	0.31
t+2	406	-0.34	0.00	0.88	0.60
t+3	307	1.35	-1.00	0.72	0.31
Panel C: Asset RM					
t+1	493	-0.59	0.00	0.84	0.96
t+2	424	-1.96	-1.00*	0.65	0.06
t+3	346	3.13	-1.50	0.46	0.30
Panel D: Production RM					
t+1	375	-3.72	0.00	0.24	0.28
t+2	322	-10.24**	-1.00	0.04	0.36
t+3	252	-0.84	-1.00	0.80	0.53