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Evidence on the Trade-Off between Real Activities Manipulation and Accrual-Based Earnings Management

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ABSTRACT: I study whether managers use real activities manipulation and accrual-based earnings management as substitutes in managing earnings. I find that managers trade off the two earnings management methods based on their relative costs and that managers adjust the level of accrual-based earnings management according to the level of real activities manipulation realized. Using an empirical model that incorporates the costs associated with the two earnings management methods and captures managers' sequential decisions, I document large-sample evidence consistent with managers using real activities manipulation and accrual-based earnings management as substitutes.

Keywords: *real activities manipulation; accrual-based earnings management; trade-off.*

Data Availability: *Data are available from public sources indicated in the text.*

I. INTRODUCTION

I study how firms trade off two earnings management strategies, real activities manipulation and accrual-based earnings management, using a large sample of firms over 1987–2008. Prior studies have shown evidence of firms altering real activities to manage earnings (e.g., Roychowdhury 2006; Graham et al. 2005) and evidence that firms make choices between the two earnings management strategies (Cohen et al. 2008; Cohen and Zarowin 2010; Badertscher 2011). My study extends research on the trade-off between real activities manipulation and accrual-based earnings management by documenting a set of variables that explain the costs of both real and

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accrual earnings management. I provide evidence for the trade-off decision as a function of the relative costs of the two activities and show that there is direct substitution between them after the fiscal year-end due to their sequential nature.

Real activities manipulation is a purposeful action to alter reported earnings in a particular direction, which is achieved by changing the timing or structuring of an operation, investment, or financing transaction, and which has suboptimal business consequences. The idea that firms engage in real activities manipulation is supported by the survey evidence in Graham et al. (2005).[1] They report that 80 percent of surveyed CFOs stated that, in order to deliver earnings, they would decrease research and development (R&D), advertising, and maintenance expenditures, while 55 percent said they would postpone a new project, both of which are real activities manipulation.

Unlike real activities manipulation, which alters the execution of a real transaction taking place during the fiscal year, accrual-based earnings management is achieved by changing the accounting methods or estimates used when presenting a given transaction in the financial statements. For example, changing the depreciation method for fixed assets and the estimate for provision for doubtful accounts can bias reported earnings in a particular direction without changing the underlying transactions.

The focus of this study is on how managers trade off real activities manipulation and accrual-based earnings management. This question is important for two reasons. First, as mentioned by Fields et al. (2001), examining only one earnings management technique at a time cannot explain the overall effect of earnings management activities. In particular, if managers use real activities manipulation and accrual-based earnings management as substitutes for each other, then examining either type of earnings management activities in isolation cannot lead to definitive conclusions. Second, by studying how managers trade off these two strategies, this study sheds light on the economic implications of accounting choices—that is, whether the costs that managers bear for manipulating accruals affect their decisions about real activities manipulation. As such, the question has implications about whether enhancing SEC scrutiny or reducing accounting flexibility in GAAP, for example, might increase the levels of real activities manipulation engaged in by firms.

I start by analyzing the implications for managers' trade-off decisions due to the different costs and timing of the two earnings management strategies. First, because both are costly activities, firms trade off real activities manipulation versus accrual-based earnings management based on their relative costliness. That is, when one activity is relatively more costly, firms engage in more of the other. Because firms face different costs and constraints for the two earnings management approaches, they show differing abilities to use the two strategies. Second, real activities manipulation must occur during the fiscal year and is realized by the fiscal year-end, after which managers still have the chance to adjust the level of accrual-based earnings management. This timing difference implies that managers would adjust the latter based on the outcome of real activities manipulation. Hence, there is also a direct, substitutive relation between the two; if real activities manipulation turns out to be unexpectedly high (low), then managers will decrease (increase) the amount of accrual-based earnings management they carry out.

Following prior studies, I examine real activities manipulation through overproduction and cutting discretionary expenditures (Roychowdhury 2006; Cohen et al. 2008; Cohen and Zarowin 2010). I test the hypotheses using a sample of firms that are likely to have managed earnings. As

[1] In particular, Graham et al. (2005) note that, "[t]he opinion of 15 of 20 interviewed executives is that every company would/should take actions such as these [real activities manipulation] to deliver earnings, as long as the actions are within GAAP and the real sacrifices are not too large." Graham et al. (2005) further conjecture that executives' greater emphasis on real activities manipulation rather than accrual-based earnings management may be due to their reluctance to admit to accounting-based earnings management in the aftermath of the Enron and WorldCom accounting scandals.

suggested by prior research, earnings management is likely to occur when firms just beat/meet an important earnings benchmark (Burgstahler and Dichev 1997; Degeorge et al. 1999). Using a sample containing more than 6,500 earnings management suspect firm-years over the period 1987–2008, I show the empirical results that real activities manipulation is constrained by firms' competitive status in the industry, financial health, scrutiny from institutional investors, and the immediate tax consequences of manipulation. The results also show that accrual-based earnings management is constrained by: the presence of high-quality auditors; heightened scrutiny of accounting practice after the passage of the Sarbanes-Oxley Act (SOX); and firms' accounting flexibility, as determined by their accounting choices in prior periods and the length of their operating cycles. I find significant positive relations between the level of real activities manipulation and the costs associated with accrual-based earnings management, and also between the level of accrual-based earnings management and the costs associated with real activities manipulation, supporting the hypothesis that managers trade off the two approaches according to their relative costliness. There is a significant and negative relation between the level of accrual-based earnings management and the amount of unexpected real activities manipulation, consistent with the hypothesis that managers "fine-tune" accruals after the fiscal year-end based on the realized real activities manipulation. Additional Hausman tests show results consistent with the decision of real activities manipulation preceding the decision of accrual-based earnings management.

Two recent studies have examined the trade-off between real activities manipulation and accrual-based earnings management. Cohen et al. (2008) document that, after the passage of SOX, the level of accrual-based earnings management declines, while the level of real activities manipulation increases, consistent with firms switching from the former to the latter as a result of the post-SOX heightened scrutiny of accounting practice. Cohen and Zarowin (2010) show that firms engage in both forms of earnings management in the years of a seasoned equity offering (SEO). They show further that the tendency for SEO firms to use real activities manipulation is positively correlated with the costs of accrual-based earnings management in these firms.[2]

Compared to prior studies, this study contributes to the earnings management literature by providing a more complete picture of how managers trade off real activities manipulation and accrual-based earnings management. First, it documents the trade-off in a more general setting by using a sample of firms that are likely to have managed earnings to beat/meet various earnings targets. The evidence for the trade-off decisions discussed in this study does not depend on a specific period (such as around the passage of SOX, as in Cohen et al. [2008]) or a significant corporate event (such as a SEO, as in Cohen and Zarowin [2010]).

Second, to my knowledge, mine is the first study to identify a set of costs for real activities manipulation and to examine their impact on both real and accrual earnings management activities. Prior studies (Cohen et al. 2008; Cohen and Zarowin 2010) only examine the costs of accrual-based earnings management. By including the costs of real activities manipulation, this study provides evidence for the trade-off as a function of the relative costs of the two approaches. That is, the level of each earnings management activity decreases with its own costs and increases with the costs of the other. In this way, I show that firms prefer different earnings management strategies in a predictive manner, depending on their operational and accounting environment.

Third, I consider the sequential nature of the two earnings management strategies. Most prior studies on multiple accounting and/or economic choices implicitly assume that managers decide on multiple choices simultaneously without considering the sequential decision process as an alternative process (Beatty et al. 1995; Hunt et al. 1996; Gaver and Paterson 1999; Barton 2001;

[2] Cohen and Zarowin (2010) do not examine how accrual-based earnings management for SEO firms varies based on the costs of real and accrual earnings management.

Pincus and Rajgopal 2002; Cohen et al. 2008; Cohen and Zarowin 2010). In contrast, my empirical model explicitly considers the implication of the difference in timing between the two earnings management approaches. Because real activities manipulation has to occur during the fiscal year, but accrual manipulation can occur after the fiscal year-end, managers can adjust the extent of the latter based on the realized outcomes of the former. I show that, unlike the trade-off during the fiscal year, which is based on the relative costliness of the two strategies, there is a direct substitution between the two approaches at year-end when real activities manipulation is realized. Unexpectedly high (low) real activities manipulation realized is directly offset by a lower (higher) amount of accrual earnings management.

Section II reviews relevant prior studies. Section III develops the hypotheses. Section IV describes the research design, measurement of real activities manipulation, accrual-based earnings management, and independent variables. Section V reports sample selection and empirical results. Section VI concludes and discusses the implications of my results.

II. RELATED LITERATURE

The extensive literature on earnings management largely focuses on accrual-based earnings management (reviewed by Schipper 1989; Healy and Wahlen 1999; Fields et al. 2001). A smaller stream of literature investigates the possibility that managers manipulate real transactions to distort earnings. Many such studies examine managerial discretion over R&D expenditures (Baber et al. 1991; Dechow and Sloan 1991; Bushee 1998; Cheng 2004). Other types of real activities manipulation that have been explored include cutting advertising expenditures (Cohen et al. 2010), stock repurchases (Hribar et al. 2006), sales of profitable assets (Herrmann et al. 2003; Bartov 1993), sales price reductions (Jackson and Wilcox 2000), derivative hedging (Barton 2001; Pincus and Rajgopal 2002), debt-equity swaps (Hand 1989), and securitization (Dechow and Shakespeare 2009).

The prevalence of real activities manipulation as an earnings management tool was not well understood until recent years. Graham et al. (2005) survey more than 400 executives and document the widespread use of real activities manipulation. Eighty percent of the CFOs in their survey stated that, in order to meet an earnings target, they would decrease expenditure on R&D, advertising, and maintenance, while 55 percent said they would postpone a new project, even if such delay caused a small loss in firm value. Consistent with this survey, Roychowdhury (2006) documents large-sample evidence suggesting that managers avoid reporting annual losses or missing analyst forecasts by manipulating sales, reducing discretionary expenditures, and overproducing inventory to decrease the cost of goods sold, all of which are deviations from otherwise optimal operational decisions, with the intention of biasing earnings upward.

Recent research has started to examine the consequence of real activities manipulation. Gunny (2010) finds that firms that just meet earnings benchmarks by engaging in real activities manipulation have better operating performance in the subsequent three years than do firms that do not engage in real activities manipulation and miss or just meet earnings benchmarks. Bhojraj et al. (2009), on the other hand, show that firms that beat analyst forecasts by using real and accrual earnings management have worse operating performance and stock market performance in the subsequent three years than firms that miss analyst forecasts without earnings management.

Most previous research on earnings management examines only one earnings management tool in settings where earnings management is likely to occur (e.g., Healy 1985; Dechow and Sloan 1991; Roychowdhury 2006). However, given the portfolio of earnings management strategies, managers probably use multiple techniques at the same time. A few prior studies (Beatty et al. 1995; Hunt et al. 1996; Gaver and Paterson 1999; Barton 2001; Pincus and Rajgopal 2002; Cohen

et al. 2008; Cohen and Zarowin 2010; Badertscher 2011) examine how managers use multiple accounting and operating measures to achieve one or more goals.

Beatty et al. (1995) study a sample of 148 commercial banks. They identify two accrual accounts (loan loss provisions and loan charge-offs) and three operating transactions (pension settlement transactions, miscellaneous gains and losses due to asset sales, and issuance of new securities) that these banks can adjust to achieve three goals (optimal primary capital, reported earnings, and taxable income levels). The authors construct a simultaneous equation system, in which the banks minimize the sum of the deviations from the three goals and from the optimal levels of the five discretionary accounts.[3] They find evidence that some, but not all, of the discretionary accounts (including both accounting choices and operating transactions) are adjusted jointly for some of the objectives identified.

Barton (2001) and Pincus and Rajgopal (2002) study how firms manage earnings volatility using a sample of *Fortune* 500 and oil and gas firms, respectively. Both studies use simultaneous equation systems, in which derivative hedging and accrual management are simultaneously determined to manage earnings volatility. Barton (2001) suggests that the two activities are used as substitutes, as evidenced by the negative relation between the two after controlling for the desired level of earnings volatility. Pincus and Rajgopal (2002) find a similar negative relation, but only in the fourth quarter.

There are two limitations in the approach taken by the above studies. First, in the empirical tests, they assume that the costs of adjusting discretionary accounts are constant across all firms and, hence, do not generate predictions or incorporate empirical proxies for the costs. In other words, they do not consider that discretion in some accounts is more costly to adjust for some firms. Hence, these studies fail to consider the trade-off among different tools due to their relative costs. Second, they assume all decisions are made simultaneously. If some decisions are made before others, then this assumption can lead to misspecification in their equation system.

Badertscher (2011) examines overvaluation as an incentive for earnings management. He finds that during the sustained period of overvaluation, managers use accrual earnings management in early years, real activities manipulation in later years, and non-GAAP earnings management as a last resort. He claims that the duration of overvaluation is an important determinant in managers' choice of earnings management approaches, but he does not model the trade-off between real activities manipulation and accrual-based earnings management based on their relative costliness, nor does his study examine the implication of the sequential nature of the two activities during the year.

Two recent studies examine the impact of the costs of accrual-based earnings management on the choice of earnings management strategies. Cohen et al. (2008) show that, on average, accrual-based earnings management declines, but real activities manipulation increases, after the passage of SOX. They focus on one cost of accrual-based earnings management, namely the heightened post-SOX scrutiny of accounting practice, and its impact on the levels of real and accrual earnings management. Using a sample of SEO firms, Cohen and Zarowin (2010) examine several costs of accrual-based earnings management and show that they are positively related to the tendency to use real activities manipulation in the year of a SEO. Neither study examines the costs of real activities manipulation or considers the sequential nature of the two strategies. Hence, they do not show the trade-off decision as a function of the relative costs of the two strategies or the direct substitution between the two after the fiscal year-end.

[3] Hunt et al. (1996) and Gaver and Paterson (1999) follow Beatty et al. (1995) and construct similar simultaneous equation systems.

III. HYPOTHESES DEVELOPMENT

Consistent with prior research on multiple earnings management strategies, I predict that managers use real activities manipulation and accrual-based earnings management as substitutes to achieve the desired earnings targets. Unlike prior research, however, I investigate the differences in the costs and timing of real activities manipulation and accrual-based earnings management, and their implications for managers' trade-off decisions.

Both real activities manipulation and accrual-based earnings management are costly activities. Firms are likely to face different levels of constraints for each strategy, which will lead to varying abilities to use them. A manager's trade-off decision, therefore, depends on the relative costliness of the two earnings management methods, which is, in turn, determined by the firm's operational and accounting environment. That is, given the desired level of earnings, when discretion is more constrained for one earnings management tool, the manager will make more use of the other. This expectation can be expressed as the following hypothesis:

H1: Other things being equal, the relative degree of accrual-based earnings management *vis-à-vis* real activities manipulation depends on the relative costs of each action.

Accrual-based earnings management is constrained by scrutiny from outsiders and the available accounting flexibility. For example, a manager might find it harder to convince a high-quality auditor of his/her aggressive accounting estimates than a low-quality auditor. A manager might also feel that accrual-based earnings management is more likely to be detected when regulators heighten scrutiny of firms' accounting practice. Other than scrutiny from outsiders, accrual-based earnings management is constrained by the flexibility within firms' accounting systems. Firms that are running out of such flexibility due to, for example, having made aggressive accounting assumptions in the previous periods face an increasingly high risk of being detected by auditors and violating GAAP with more accrual-based earnings management. Hence, I formulate the following two subsidiary hypotheses to H1:

H1a: Other things being equal, firms facing greater scrutiny from auditors and regulators have a higher level of real activities manipulation.

H1b: Other things being equal, firms with lower accounting flexibility have a higher level of real activities manipulation.

Real activities manipulation, as a departure from optimal operational decisions, is unlikely to increase firms' long-term value. Some managers might find it particularly costly because their firms face intense competition in the industry. Within an industry, firms are likely to face various levels of competition and, therefore, are under different amounts of pressure when deviating from optimal business strategies. Management research (as reviewed by Woo [1983]) shows that market leaders enjoy more competitive advantages than do followers, due to their greater cumulative experience, ability to benefit from economies of scale, bargaining power with suppliers and customers, attention from investors, and influence on their competitors. Therefore, managers in market-leader firms may perceive real activities manipulation as less costly because the erosion to their competitive advantage is relatively small. Hence, I predict the following:

H1c: Other things being equal, firms without market-leader status have a higher level of accrual-based earnings management.

For a firm in poor financial health, the marginal cost of deviating from optimal business strategies is likely to be high. In this case, managers might perceive real activities manipulation as relatively costly because their primary goal is to improve operations. This view is supported by the survey evidence documented by Graham et al. (2005), who find that CFOs admit that if the

company is in a "negative tailspin," then managers' efforts to survive will dominate their reporting concerns. This reasoning leads to the following subsidiary hypothesis to H1:

H1d: Other things being equal, firms with poor financial health have a higher level of accrual-based earnings management.

Managers might find it difficult to manipulate real activities when their operation is being monitored closely by institutional investors. Prior studies suggest that institutional investors play a monitoring role in reducing real activities manipulation.[4] Bushee (1998) finds that, when institutional ownership is high, firms are less likely to cut R&D expenditure to avoid a decline in earnings. Roychowdhury (2006) also finds a negative relation between institutional ownership and real activities manipulation to avoid losses. Unlike accrual-based earnings management, real activities manipulation has real economic consequences for firms' long-term value. Institutional investors, being more sophisticated and informed than other investors, are likely to have a better understanding of the long-term implication of firms' operating decisions, leading to *more* effort to monitor and curtail real activities manipulation than accrual-based earnings management, as predicted in the following subsidiary hypothesis:

H1e: Other things being equal, firms with higher institutional ownership have a higher level of accrual-based earnings management.

Real activities manipulation is also costly due to tax incentives. It might be subject to a higher level of book-tax conformity than accrual-based earnings management, because the former has a direct cash flow effect in the current period, while the latter does not. Specifically, when firms increase book income by cutting discretionary expenditures or by overproducing inventory, they also increase taxable income and incur higher tax costs in the current period.[5] In contrast, management of many accrual accounts increases book income without current-period tax consequences. For example, increasing the estimated useful lives of long-term assets, decreasing write-downs for impaired assets, recognizing unearned revenue aggressively, and decreasing bad debt expense all can increase book income without necessarily increasing current-year taxable income. Therefore, for firms with higher marginal tax rates, the net present value of the tax costs associated with real activities manipulation is likely to be higher than that of accrual-based earnings management, leading to the following prediction:

H1f: Other things being equal, firms with higher marginal tax rates have a higher level of accrual-based earnings management.

Another difference between the two earnings management strategies that will influence managers' trade-off decisions is their different timing. H1 predicts that the two earnings management strategies are jointly determined and the trade-off depends on their relative costliness. However, a joint decision does not imply a simultaneous decision. Because real activities manipulation changes the timing and/or structuring of business transactions, such decisions and activities have to take place during the fiscal year. Shortly after the year-end, the outcome of the real activities manipulation is revealed, and managers can no longer engage in it. Note that, when a manager alters real business decisions to manage earnings, s/he does not have perfect control over

[4] However, there is also evidence that "transient" institutions, or those with high portfolio turnover and highly diversified portfolio holdings, increase managerial myopic behavior (e.g., Porter 1992; Bushee 1998; Bushee 2001). In this study, I focus on the average effect of institutional ownership on firms' earnings management activities without looking into the investment horizon of different institutions.

[5] Other types of real activities manipulation, such as increasing sales by discounts and price cuts, and sale of long-term assets, are also book-tax-conforming earnings management.

the exact amount of the real activities manipulation attained. For example, a pharmaceutical company cuts current-period R&D expenditure by postponing or canceling development of a certain drug. This real decision can include a hiring freeze and shutting down the research site. The manager may be able to make a rough estimate of the dollar amount of the impact on R&D expenditure from these decisions, but s/he does not have perfect information about it.[6] Therefore, managers face uncertainty when they execute real activities manipulation. After the fiscal year-end, the realized amount of the real activities manipulation could be higher or lower than the amount originally anticipated.

On the other hand, after the fiscal year-end but before the earnings announcement date, managers can still adjust the accruals by changing the accounting estimates or methods. In addition, unlike real activities manipulation, which distorts earnings by executing transactions differently, accrual management impacts reported earnings in a more immediate and certain manner. Therefore, when managers observe the impact of real activities manipulation on earnings at the fiscal year-end, they can offset an unexpectedly high (low) impact by using less (more) accrual management. This prediction, which is my next hypothesis, is based on the premise that managers will use the two earnings management methods as substitutes:

H2: Managers adjust the amount of accrual-based earnings management after real activities manipulation is realized; the level of accrual-based earnings management is negatively related to the unexpected amount of real activities manipulation.

IV. RESEARCH DESIGN

Real Activities Manipulation

Following Roychowdhury (2006), I examine the following manipulation of real activities: increasing earnings by reducing the cost of goods sold by overproducing inventory, and cutting discretionary expenditures, including R&D, advertising, and selling, general, and administrative (SG&A) expenditures.[7] The former is measured by the abnormal level of production costs, the latter by the abnormal level of discretionary expenditures. Subsequent studies using the same metrics (Cohen et al. 2008; Cohen and Zarowin 2010) provide further evidence that these measures capture real activities manipulation.

I estimate the normal level of production costs following Roychowdhury (2006):

$$PROD_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(S_t/A_{t-1}) + \alpha_3(\Delta S_t/A_{t-1}) + \alpha_4(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t, \quad (1)$$

where $PROD_t$ is the sum of the cost of goods sold in year t and the change in inventory from $t-1$ to t; A_{t-1} is the total assets in year $t-1$; S_t is the net sales in year t; and ΔS_t is the change in net sales from year $t-1$ to t. Equation (1) is estimated cross-sectionally for each industry-year with at least 15 observations, where industry is defined following Fama and French (1997),[8] such that the estimated coefficients vary

[6] Another example is reducing traveling expenditures by requiring employees to fly economy class instead of allowing them to fly business class. This change could be suboptimal because employees might reduce the number of visits they make to important clients or because employees' morale might be adversely impacted, leading to greater turnover. The manager cannot know for certain the exact amount of SG&A being cut, as s/he does not know the number of business trips taken by employees during the year.

[7] In this study, I do not examine abnormal cash flows from operations because, as discussed in Roychowdhury (2006), real activities manipulation impacts this in different directions and the net effect is ambiguous. Specifically, Roychowdhury (2006) points out that price discount, channel stuffing, and overproduction all decrease cash flows from operations, while cutting discretionary expenditures increases them.

[8] The results are similar if I use the two-digit SIC industry grouping for all the estimation regressions.

over time and reflect the impact on production costs from industry-wide economic conditions during the year. The abnormal level of production costs (RM_{PROD}) is measured as the estimated residual from Equation (1). The higher the residual, the larger is the amount of inventory overproduction, and the greater is the increase in reported earnings through reducing the cost of goods sold.[9]

Also following Roychowdhury (2006), I estimate the normal level of discretionary expenditures using the following equation:

$$DISX_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(S_{t-1}/A_{t-1}) + \varepsilon_t, \quad (2)$$

where $DISX_t$ is the discretionary expenditures (i.e., the sum of R&D, advertising, and SG&A expenditures) in year t. I estimate the above regression cross-sectionally for industry-years with at least 15 observations. The abnormal level of discretionary expenditures is measured as the estimated residual from the regression. I multiply the residuals by −1 (denoted as RM_{DISX}) such that higher values indicate greater amounts of discretionary expenditures cut by firms to increase reported earnings. I aggregate the two real activities manipulation measures into one proxy, *RM*, by taking their sum.

Accrual-Based Earnings Management

Following prior literature, I use discretionary accruals to proxy for accrual-based earnings management. Discretionary accruals are the difference between firms' actual accruals and the normal level of accruals. I estimate the latter using the following modified Jones (1991) model:

$$Accruals_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(\Delta S_t/A_{t-1}) + \alpha_3(PPE_t/A_{t-1}) + \varepsilon_t, \quad (3)$$

where $Accruals_t$ is the earnings before extraordinary items and discontinued operations minus the operating cash flows reported in the statement of cash flows in year t (see Collins and Hribar 1999);[10] and PPE_t is the gross property, plant, and equipment. I estimate the above regression cross-sectionally for industry-years with at least 15 observations. The estimated residuals (*AM*), capturing discretionary accruals, are my proxy for accrual-based earnings management.[11]

Earnings Management Suspect Firms and the Correction for Potential Sample Bias

Because the focus of the study is on firms' trade-off decisions between the two earnings management approaches, not the decision of whether to engage in earnings management, I test the hypothesis in a setting in which earnings management is likely to occur. Using such a sample also increases the power of the tests of the trade-off decisions. Prior literature suggests that firm-years with earnings right at or just above benchmarks are likely to manage earnings to meet these important benchmarks (e.g., Burgstahler and Dichev 1997; Degeorge et al. 1999; Bartov et al. 2002). Graham et al. (2005) also provide survey evidence that CFOs find the following earnings benchmarks the most important: same quarter last year, analyst consensus forecast, zero earnings, and previous quarter earnings per share (EPS). Accordingly, I define earnings management suspects as firm-years with earnings just beating/meeting the prior year's earnings, zero earnings, and analyst

[9] I follow Roychowdhury (2006) and include intercepts in the estimation models for the normal levels of production costs, discretionary expenditures, and accruals. The empirical results are similar if I do not include intercepts in these estimation models.

[10] The results are similar if I measure accruals using balance sheet data.

[11] As a robustness check, I measure real activities manipulation and accrual-based earnings management as indicator variables that equal 1 if *RM* and *AM* are greater than 0, and 0 otherwise. Such measurement addresses the potential nonlinear relation between manipulation activities and their costs, and yields similar results.

consensus forecast. In cases where firms provide management guidance, I also include firm-years just beating/meeting management forecasts in the earnings management suspect sample.

The hypotheses on the trade-off between real activities manipulation versus accrual-based earnings management are tested using the earnings management suspect firms. Using a non-randomly selected sample in the regression estimation creates a potential omitted-variable problem, which can bias the coefficient estimates of the explanatory variables. To address this, I conduct the Heckman (1979) two-step procedure to correct for the potential sample selection bias in the main tests. In the first step, I estimate a selection model using all the sample firms and obtain the inverse Mills ratio (*IMR*).[12] In the second step, I include *IMR* in the main tests on the suspect sample as a control variable to correct for potential selection bias. The following probit model is used in the Heckman first step to explain earnings management suspect firms:

$$\begin{aligned} Prob[Suspect_t = 1] = Probit(&\gamma_0 + \gamma_1 Habitual\_Beater_t + \gamma_2 Stock\_Issuance_{t+1} \\ &+ \gamma_3 Analyst\_Following_t + \gamma_4 MtoB_{t-1} + \gamma_5 Shares_t + \gamma_6 ROA_t \\ &+ \sum_k \gamma_{7,k} Year\_Indicator_{k,t} + \varepsilon_t). \end{aligned} \quad (4)$$

The dependent variable in the selection model is, $Suspect_t$, which equals 1 if a firm just beats/meets one of the earnings benchmarks discussed above, and 0 otherwise. Selection of the independent variables builds on prior research that suggests capital market incentives dominate other incentives for beating/meeting earnings targets. Both Bartov et al. (2002) and Kasznik and McNichols (2002) find that the market places a greater premium on "habitual" than "sporadic" beaters, implying that firms that have repeatedly beaten earnings targets have stronger incentives to keep doing so. I use the number of times of beating/meeting analysts' forecast consensus in the past four quarters ($Habitual\_Beater_t$) to capture this. Teoh et al. (1998) and Rangan (1998) find that managers manage earnings at the time of SEOs, suggesting stronger incentives to boost their stock prices just before they issue equity. I measure this incentive using an indicator variable ($Stock\_Issuance_{t+1}$) that equals 1 if the firm issues equity in the next year, and 0 otherwise. Because analyst coverage might create pressure for managers to issue guidance and beat forecast targets, I include the log of 1 plus the number of analysts following the firm ($Analyst\_Following_t$) as an explanatory variable. Both Barth et al. (1999) and Skinner and Sloan (2002) show that the incentive to report earnings increases is increasing with firms' growth opportunities. I include market-to-book ratio at the beginning of the year ($MtoB_{t-1}$) to capture firms' growth opportunities. As earnings benchmarks are often per-share numbers, one penny short in EPS translates into more dollars of actual earnings for firms with more shares outstanding. Hence, I include the log number of shares outstanding as a control variable ($Shares_t$). Firm profitability, (return on assets, ROA_t, computed using net income for the rolling four quarters ending with the third quarter of year t) and year indicators are also included.[13,14]

[12] The inverse Mills ratio is estimated as, $\varphi(z)/\Phi(z)$ where z is the fitted value of the probit regression index function; φ is the density function for standard normal distribution; and Φ is the cumulative density function for a standard normal distribution.

[13] I use this measure because the fourth-quarter ROA is the one most likely affected by earnings management activities. The empirical results based on the ROA of the four quarters in year t are similar.

[14] Managers' equity compensation also provides an incentive to manage earnings (see Cheng and Warfield 2005). As a sensitivity test, I include equity incentive as defined in Cheng and Warfield (2005) as an additional explanatory variable in Equation (4). The estimated coefficient of equity incentive is positive, consistent with equity compensation providing an incentive to manage earnings. However, because the variable requires data from Execucomp, the data requirement shrinks the sample size substantially (for the Heckman first step by 82.0 percent, from 121,861 to 21,928 firm-year observations). Hence, I exclude equity incentive to avoid this significant loss of sample. For the smaller sample where equity incentive data are available, I include this variable in the Heckman first stage; the main results are similar.

The Trade-Off between Real Activities Manipulation and Accrual-Based Earnings Management

To investigate how managers trade off real versus accrual-based earnings management, I estimate the following equations using the earnings management suspect sample:

$$RM_t = \beta_0 + \sum_k \beta_{1,k} Cost\ of\ RM_{k,t} + \sum_l \beta_{2,l} Cost\ of\ AM_{l,t} + \sum_m \beta_{3,m} Control_{m,t} + u_t. \quad (5)$$

$$AM_t = \gamma_0 + \sum_k \gamma_{1,k} Cost\ of\ AM_{k,t} + \sum_l \gamma_{2,l} Cost\ of\ RM_{l,t} + \gamma_3 Unexpected\ RM_t + \sum_m \gamma_{4,m} Control_{m,t} + v_t. \quad (6)$$

H1 predicts that the trade-off between the two earnings management approaches is determined by their relative costliness. That is, when the costs associated with accrual-based earnings management are high, firms use real activities manipulation more, and *vice versa*. Therefore, β_2 in Equation (5) and γ_2 in Equation (6) are both expected to be positive. Because each earnings management approach is constrained by its own costs, β_1 in Equation (5) and γ_1 in Equation (6) are expected to be negative. As discussed above, real activities manipulation has to be executed and realized by the fiscal year-end, after which managers can still adjust the extent of accrual-based earnings management based on the observed impact of real manipulation on earnings (i.e., H2). Therefore, I use a recursive equation system to capture this sequence of decisions. That is, the extent of real activities manipulation is determined by the costs of both earnings management tools and other predetermined firm characteristics, but not by the realized outcome of accrual-based earnings management. The extent of accrual-based earnings management is determined not only by the costs of earnings management activities, but also by the unexpected amount of real activities manipulation realized. H2 predicts that managers increase (decrease) the extent of accrual-based earnings management when real activities manipulation turns out to be unexpectedly low (high). The hypothesized direct and substitutive relation between the two earnings management methods implies a negative sign on γ_3 in the accrual management equation. Because the dependency between the two types of earnings management is unidirectional, both regressions in the recursive equation system can be estimated consistently using OLS estimation. In the accrual-based earnings management equation, $Unexpected\ RM_t$ is measured as the estimated residual from Equation (5).

Costs Associated with Real Activities Manipulation

In Section III, I identify four types of costs associated with real activities manipulation. The first is a firm's market-leader status in the industry at the beginning of the year ($Market\_Share_{t-1}$). *Market_Share* captures the inverse of the costs associated with real activities manipulation. It is measured as the ratio of a company's sales to the total sales of its industry. In order to reduce measurement error in this proxy, I follow Harris (1998) and use a finer industry grouping based on three-digit SIC codes, which captures industry competition better than the Fama-French classification.

The second type of cost concerns firms' financial health. Following prior research, I use a modified version of Altman's Z-score (Altman 1968, 2000) to proxy for a firm's financial health:

$$ZSCORE_t = 0.3\frac{NI_t}{Asset_t} + 1.0\frac{Sales_t}{Asset_t} + 1.4\frac{Retained\ Earnings_t}{Asset_t} + 1.2\frac{Working\ Capital_t}{Asset_t} + 0.6\frac{Stock\ Price \times Shares\ Outstanding_t}{Total\ Liabilities_t}.$$

I use financial health at the beginning of the year ($ZSCORE_{t-1}$) to capture the cost of real activities manipulation. Higher values of *ZSCORE* indicate a healthier financial condition and a lower cost associated with real activities manipulation.

The third type of cost recognizes the influence of institutional ownership on real activities manipulation. I use the percentage of institutional ownership at the beginning of year *t* ($INST_{t-1}$) as this measure. The last type of cost is firms' marginal tax rates (MTR_t). The measurement that I use is developed and provided by Professor John Graham (see Graham and Mills 2008; Graham 1996a, 1996b, http://faculty.fuqua.duke.edu/~jgraham/).[15] Higher values of *INST* and *MTR* indicate high costs for real activities manipulation.

Costs Associated with Accrual-Based Earnings Management

In Section III, I identify two types of costs associated with accrual-based earnings management. I use the following five proxies to capture these costs. The first three concern the scrutiny of auditors and regulators. The first, $Big8_t$, indicates whether the firm's auditor is one of the Big 8.[16] Prior research shows that Big 8 audit firms constrain earnings management through discretionary accruals (e.g., DeFond and Jiambalvo 1991, 1993; Becker et al. 1998; Francis et al. 1999). This is because they are likely to be more experienced, to invest more resources in auditing, and to have more reputation at risk than smaller audit firms. The second proxy is auditor tenure. Stice (1991) finds that audit quality increases with tenure and argues that the risk of not detecting errors due to unfamiliarity decreases with tenure. Myers et al. (2003) document a significant and negative relation between accrual-based earnings management and auditor tenure after controlling for auditor type (Big 8 versus non-Big 8). They suggest that on average, auditors place greater constraints on earnings management through discretionary accruals as their relationship with the client lengthens. Therefore, I consider auditor tenure ($Audit\_Tenure_t$) as a proxy for auditor scrutiny and measure it as an indicator variable that equals 1 if the number of years the auditor has audited the client is above the sample median of six years, and 0 otherwise. The third proxy is whether the observation is from the post-SOX period, SOX_t, measured as an indicator variable that equals 1 if the fiscal year is after 2003, and 0 otherwise. Aiming at restoring market confidence after a series of high-profile accounting scandals during 2000–2001, SOX is likely to heighten scrutiny of firms' accounting practices from both auditors and regulators. Cohen et al. (2008) find results consistent with managers decreasing accrual earnings management after the passage of SOX.

The next two proxies measure the flexibility within firms' accounting systems. The first one captures accrual-based earnings management in prior years. Due to the limited flexibility within GAAP and the reversal of accruals, managers' ability to manipulate accruals upward in the current period is constrained by accrual management activities in previous periods. I use Barton and Simko's (2002) balance sheet measure of previous accounting choices—net operating assets at the beginning of the year (NOA_{t-1})—as a proxy for the extent of accrual management in previous periods. The rationale for this measure is that, because of the articulation between the income statement and the balance sheet, abnormal accruals reflected in past earnings are also reflected in net assets; hence, the latter are overstated when firms engage in accrual manipulation in previous periods. I predict that the cost of accrual management in the current period is positively related to the extent of overstated net operating assets at the beginning of the year. I measure *NOA* as an

[15] The marginal tax rate developed by Graham (1996a) incorporates information such as a net operating loss (NOL) carryforward. More importantly, his simulated marginal tax rate captures an important dynamic feature of the tax code such as the effects of NOL carrybacks and carryforwards in the near future (see Graham 1996a; Graham and Mills 2007; Shevlin 1990). When using the cruder measure of NOL carryforward, my results remain similar.

[16] Or Big 6, Big 5, and Big 4 audit firms in recent years.

indicator variable that equals 1 if the net operating assets (i.e., shareholders' equity less cash and marketable securities plus total debt) at the beginning of the year divided by lagged sales are above the median of the corresponding industry-year, and 0 otherwise. The second proxy for firms' accounting flexibility is the length of their operating cycles ($Cycle_{t-1}$). Firms with longer operating cycles have greater flexibility for accrual management because they have larger accrual accounts and a longer period for accruals to reverse. The operating cycle is computed as the days receivable plus the days inventory less the days payable at the beginning of the year, as defined by Dechow (1994).

Control Variables

In both equations, I include the inverse Mills ratio (*IMR*) from the first step of the Heckman procedure to correct for the potential sample bias;[17] *ROA*, computed using net income for the rolling four quarters ending with the third quarter of the year, to control for firm performance; industry-adjusted log value of total assets (*Asset*) to control for relative firm size in the industry; market-to-book ratio (*MtoB*) to control for firms' growth rate; and year indicators to control for general economy conditions in each year. Because both real activities manipulation and accrual-based earnings management are positively related to the amount of total earnings management activities needed to meet benchmarks, I follow Beatty et al. (1995) and Hunt et al. (1996) and include in the real activities manipulation equation pre-managed earnings (*Earn*) to control for the goal of managing earnings upward. In the accrual management equation, I include the predicted amount of real activities manipulation from Equation (5) (*Pred_RM*) to control for the extent of income-increasing earnings management activities.[18]

V. SAMPLE SELECTION AND RESULTS

Measures of Real Activities Manipulation and Accrual-Based Earnings Management

I start from the population of the CRSP/Compustat Merged Database 1987–2008, during which statement of cash flows data are available for calculating accruals (Hribar and Collins 2002). I exclude financial institutions (SIC 6000–6999) and regulated industries (SIC 4400–5000) from the sample. Table 1, Panel A reports the estimation results for the normal levels of production costs, discretionary expenditures, and total accruals (i.e., Equations (1) to (3)). The equations are estimated cross-sectionally for each industry-year with at least 15 observations. There are more than 820 industry-years available during the sample period for each estimation model. On average, each industry-year regression contains more than 150 observations. All of the mean coefficients are significant and comparable to those reported in Roychowdhury (2006). The mean adjusted R^2 is 41.97 percent for the total accruals model, 57.55 percent for the discretionary expenditure model, and 90.61 percent for the production cost model, indicating these models have reasonable to substantial explanatory power.

The estimated residuals from the relevant estimation models measure the abnormal levels of production costs, discretionary expenditures, and discretionary accruals. Higher values of abnormal

[17] *IMR* is the nonlinear combination of the first-stage regressors. As a sensitivity test, I estimate the second-stage regression by replacing *IMR* with the first-stage regressors. The empirical results remain similar.

[18] The cross-sectional variation in the desired amount of manipulation among firms explains the extent of income-increasing earnings management activities through both approaches, which is why the simple correlation between real and accrual manipulation is positive (also discussed by Cohen and Zarowin [2010] and Roychowdhury [2006]). Equation (6) captures the substitutive relation between real and accrual earnings management after controlling for their positive relation with the extent of income-increasing earnings management activities using *Pred_RM*.

TABLE 1

Measurement of Real Activities Manipulation and Accrual-Based Earnings Management

Panel A: Estimation of the Normal Levels of Production Costs, Discretionary Expenditures and Accruals[a]

$PROD_t/A_{t-1}$		$DISX_t/A_{t-1}$		$Accruals_t/A_{t-1}$	
Intercept	−0.0565	Intercept	0.0782	Intercept	−0.0390
$1/A_{t-1}$	0.0071***	$1/A_{t-1}$	0.4443***	$1/A_{t-1}$	−0.1169***
S_t/A_{t-1}	0.7585***	S_{t-1}/A_{t-1}	0.1334***	$\Delta S_t/A_{t-1}$	0.0423***
$\Delta S_t/A_{t-1}$	0.0360***			PPE_t/A_{t-1}	−0.0640***
$\Delta S_{t-1}/A_{t-1}$	−0.0105***				
Mean Adj. R^2 (%)	90.61		57.55		41.97
Mean # of obs.	151.6		160.0		159.0
# of industry-years	840		840		824

Panel B: Summary Statistics for Real Activities Manipulation and Accrual-Based Earnings Management[b]

Variable	n	Mean	Median	Std. Dev.	25%	75%
AM_t	130,998	−0.0234	0.0178	1.9042	−0.1078	0.1587
RM_t	121,119	0.0484	0.0468	1.0021	−0.2405	0.3347
RM_{PROD_t}	127,323	−0.0183	−0.0175	0.3588	−0.1655	0.1258
RM_{DISX_t}	134,423	0.0648	0.0567	0.9324	−0.1152	0.2538

Panel C: Pearson (Upper Triangle) and Spearman (Lower Triangle) Correlations

	AM_t	RM_t	RM_{PROD_t}	RM_{DISX_t}
AM_t		0.0246***	0.0136***	0.0258***
RM_t	0.0374***		0.5084***	0.8844***
RM_{PROD_t}	−0.0148***	0.6305***		0.1414***
RM_{DISX_t}	0.0733***	0.8361***	0.2570***	

*, **, *** Represent significance at 10 percent, 5 percent, and 1 percent levels, respectively.

[a] The following regressions are estimated cross-sectionally for each industry-year for the period 1987–2008. The Fama-French 48 industry grouping is used. Each model is estimated for industry-years having at least 15 observations. The reported coefficients are the mean values of the coefficients across industry-years. t-statistics are calculated using the standard errors of the coefficients across industry-years. The adjusted R^2 (number of observations) is the mean adjusted R^2 (number of observations) across industry-years.

$$PROD_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(S_t/A_{t-1}) + \alpha_3(\Delta S_t/A_{t-1}) + \alpha_4(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t. \quad (1)$$

$$DISX_t/A_{t-1} = \alpha_0 + a_1(1/A_{t-1}) + \alpha_2(S_{t-1}/A_{t-1}) + \varepsilon_t. \quad (2)$$

$$Accruals_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(\Delta S_t/A_{t-1}) + \alpha_3(PPE_t/A_{t-1}) + \varepsilon_t. \quad (3)$$

[b] AM_t and RM_{PROD_t} are estimated residuals from Equations (3) and (1), respectively; RM_{DISX_t} is the estimated residuals from Equation (2) multiplied by −1; and RM_t is the sum of RM_{PROD_t} and RM_{DISX_t}.

production costs (RM_{PROD}) and discretionary accruals (AM) indicate more real activities manipulation through overproduction and accrual-based earnings management, respectively. I multiply the residuals from the estimation model of discretionary expenditures by −1 (RM_{DISX}), such that higher values indicate a greater extent of real activities manipulation by cutting expenses. The sum of RM_{PROD} and RM_{DISX} is the measurement of the total level of real activities

manipulation (*RM*). Panel B of Table 1 reports summary statistics for the proxies of real and accrual earnings management. I winsorize the proxies at the top and bottom 1 percent to avoid extreme observations due to noisy estimation. Hence, the means of the proxies are not zero. The Pearson and Spearman correlations among the variables are shown in Table 1, Panel C. The high correlations between RM_{PROD} and *RM*, and between RM_{DISX} and *RM* are mechanical because *RM* is the sum of the two proxies. There is a positive correlation between RM_{PROD} and RM_{DISX} (Pearson correlation of 0.1414), and a positive correlation between *RM* and *AM* (Pearson correlation of 0.0246), suggesting that firms use both real activities manipulation and accrual-based earnings management.

Suspect Firms Just Beating/Meeting Important Earnings Benchmarks

To test the hypotheses about managers' trade-off decisions between real activities manipulation and accrual-based earnings management, I use a sample of earnings management suspect firms to increase power. Following prior research, I consider firm-years just beating/meeting important earnings benchmarks the situations in which earnings management is more likely to occur. Following Roychowdhury (2006), suspects just beating/meeting the zero benchmark are defined as firm-years with earnings before extraordinary items over lagged assets between 0 and 0.005. I measure suspects just beating/meeting last-year earnings as firm-years with change in basic EPS excluding extraordinary items from last year between 0 and 2 cents; and suspects just beating/meeting analyst forecast consensus (management forecasts) as firm-years with actual EPS less the last analyst forecast consensus (management forecast) before the fiscal year-end between 0 and 1 cent.[19] During the sample period, there are 3,428 firm-years just beating/meeting the zero benchmark; 7,064 just beating/meeting last-year earnings; and 7,592 and 2,142 just beating/meeting analyst forecast consensus and management forecasts, respectively.

To compare the suspect firms with a sample of non-suspect firms, I estimate the following regressions developed by Roychowdhury (2006):

$$Y_t = \beta_0 + \beta_1 MVE_{t-1} + \beta_2 MtoB_{t-1} + \beta_3 ROA_t + \beta_4 Suspect_t + \sum_j \beta_{5,j} Year\_Indicator_{t,j} + \varepsilon_t, \tag{7}$$

where the dependent variables are measures of real activities manipulation and accrual-based earnings management. Following Roychowdhury (2006), I include the log value of market value of equity (*MVE*), the market-to-book ratio (*MtoB*), and the return on assets (*ROA*) to control for systematic variation in abnormal production costs, discretionary expenditures, and accruals related to firm size, growth opportunities, and current-period firm performance, respectively. Because the dependent variables are measured as the deviations from industry-year means, the control variables are also measured in this way. *Suspect* is an indicator variable that equals 1 if the firm-year just beats/meets one of the earnings benchmarks, and 0 if it clearly misses or beats all the benchmarks. Because firm-years close to the important benchmarks might still have incentives to manage earnings upward, I define firm-years that clearly miss or beat all earnings benchmarks as those that miss or beat zero earnings by 2.5 percent of lagged total assets, and those that miss or beat analyst forecast consensus, management forecasts, and last-year EPS by more than 5 cents.[20]

Table 2 reports the estimation results. Consistent with Roychowdhury (2006), Panel A shows that, when suspects are firm-years just beating/meeting the zero benchmark, the coefficients on *Suspect* are positive for the *AM*, *RM*, RM_{PROD}, and RM_{DISX} equations (significant at least at the 10

[19] I use the actual EPS and analyst forecast consensus provided by I/B/E/S Database, and the actual EPS and management forecasts provided by First Call Database.

[20] Other cutoff points yield similar results.

TABLE 2

Suspect Firms Just Beating/Meeting Important Earnings Benchmarks

Panel A: Suspects are Firm-Years Just Beating/Meeting Zero Benchmark (n = 3,428)

	AM_t	RM_t	RM_{PROD_t}	RM_{DISX_t}
Intercept	−0.0429	−0.0224**	−0.0218***	0.0062***
MVE_{t-1}	0.0091	0.0049	−0.0074***	0.0102***
$MtoB_{t-1}$	−0.0006**	−0.0008***	0.0006***	−0.0019***
ROA_t	0.0015***	0.0072***	0.0003**	0.0840***
$Suspect_t$	0.0096*	0.0870***	0.0264***	0.0249***
Year Indicators	Yes	Yes	Yes	Yes

Panel B: Suspects are Firm-Years Just Beating/Meeting Last-Year Earnings (n = 7,064)

	AM_t	RM_t	RM_{PROD_t}	RM_{DISX_t}
Intercept	−0.0533	−0.0255**	−0.0229***	0.0002
MVE_{t-1}	−0.0025	0.0005	−0.0054***	0.0068
$MtoB_{t-1}$	−0.0001	0.0003**	−0.0001	0.0006***
ROA_t	0.0016*	0.0083***	−0.0054***	−0.0233***
$Suspect_t$	0.2659***	0.0724***	−0.0157***	0.1311***
Year Indicators	Yes	Yes	Yes	Yes

Panel C: Suspects are Firm-Years Just Beating/Meeting Analyst Forecast Consensus (n = 7,592)

	AM_t	RM_t	RM_{PROD_t}	RM_{DISX_t}
Intercept	−0.0372	−0.0225**	−0.0220***	0.0070
MVE_{t-1}	0.0052**	0.0043	−0.0086***	0.0140**
$MtoB_{t-1}$	−0.0010***	−0.0009***	0.0005***	−0.0021***
ROA_t	0.0120***	0.0071***	0.0003**	−0.0250***
$Suspect_t$	0.0323**	−0.0357	−0.0654***	0.0305
Year Indicators	Yes	Yes	Yes	Yes

Panel D: Suspects are Firm-Years Just Beating/Meeting Management Forecasts (n = 2,142)

	AM_t	RM_t	RM_{PROD_t}	RM_{DISX_t}
Intercept	−0.0536	−0.0227**	−0.0261***	0.0043
MVE_{t-1}	0.0055**	0.0059*	−0.0032***	0.0230***
$MtoB_{t-1}$	−0.0012***	−0.0009***	−0.0003***	−0.0025***
ROA_t	0.0117***	0.0071***	0.0091***	0.0069***
$Suspect_t$	−0.0338	0.0299	−0.0414***	0.0885***
Year Indicators	Yes	Yes	Yes	Yes

*, **, *** Represent significance of the coefficient at 10 percent, 5 percent, and 1 percent levels, respectively, based on firm-level clustered standard errors.

(continued on next page)

TABLE 2 (continued)

The following regression is estimated for each definition of suspect firm-years during the sample period 1987–2008:

$$Y_t = \beta_0 + \beta_1 MVE_{t-1} + \beta_2 MtoB_{t-1} + \beta_3 ROA_t + \beta_4 Suspect_t + \sum_j \beta_{5,j} Year\_Indicator_{t,j} + \varepsilon_t, \quad (7)$$

where the dependent variables are measures of real activities manipulation and accrual-based earnings management (as defined in Table 1); the estimation result of each is reported in a different column. MVE_{t-1} is the log value of market value of equity in year $t-1$; $MtoB_{t-1}$ is the ratio of market value of equity to book value of equity in year $t-1$; and ROA_t is the return on assets in year t. All three independent variables are measured as the deviations from the corresponding industry-year means; and $Suspect_t$ is an indicator variable for suspect firm-years just beating/meeting an earnings benchmark. Each panel reports the estimation results using a different definition of $Suspect_t$ as discussed below. All regressions include year indicators.

Panel A reports results for suspects just beating/meeting the zero benchmark, which are firm-years with earnings before extraordinary items over lagged total assets between 0 and 0.5 percent.

Panel B reports results for suspects just beating/meeting last-year earnings, which are firm-years with the change in basic EPS excluding extraordinary items from last year between 0 and 2 cents.

Panel C reports results for suspects just beating/meeting analyst forecast consensus, which are firm-years with actual EPS less the last analyst forecast consensus provided in the I/B/E/S Database between 0 and 1 cent.

Panel D reports results for suspects just beating/meeting management forecast, which are firm-years with actual EPS less the last management forecast before the fiscal year-end provided by First Call Database between 0 and 1 cent.

For all the panels, non-suspects are firm-years that miss or beat zero earnings benchmark by 2.5 percent of lagged total assets, and firm-years that miss or beat analyst forecast consensus, management forecasts and last-year EPS by more than 5 cents. There are 89,471 non-suspect firm-years.

percent level). For suspects just beating/meeting last-year earnings (Panel B), the coefficients on *Suspect* are significant and positive in the *AM*, *RM*, and RM_{DISX} equations, but significant and negative in the RM_{PROD} equation. For suspects just beating/meeting analyst forecast consensus (Panel C), the coefficient on *Suspect* is significant and positive in the *AM* equation. For suspects just beating/meeting management forecasts (Panel D), the coefficient on *Suspect* is significant and positive in the RM_{DISX} equation. In both Panels C and D, the coefficient on *Suspect* is insignificant in the *RM* equation and significant and negative in the RM_{PROD} equation. The results suggest that firms just beating/meeting earnings benchmarks use at least one of the real or accrual-based earnings management methods. The results also suggest that the levels of real and accrual earnings management could be driven by the cross-sectional variations of more economic determinants than those included in Equation (7), as tested shortly. Another caveat for the results in Table 2 is that, as Roychowdhury (2006) points out, firms just beating/meeting benchmarks might not be the only firms managing earnings. Other firms might manage earnings and still miss these benchmarks, or manage earnings for internal and unobservable targets. It is also possible that some suspect firms might manage earnings downward to just above the benchmarks. Both cases would decrease the power of my tests.

Heckman First-Stage Results—Correcting for the Potential Sample Selection Bias

The first step of the Heckman procedure is to estimate the probit model (Equation (4)) that explains the earnings management suspect firms and to obtain the inverse Mills ratio (*IMR*) to include in the estimation of Equations (5) and (6) as a control variable to correct for the potential omitted variable problem caused by the non-random sample. Table 3, Panel A reports the summary statistics of the independent variables included in Equation (4) and compares suspect firms with other firms included in the probit regression estimation. It shows that suspect firms beat analyst forecast consensus more frequently, and are more likely to have SEOs in the following year than do non-suspect firms. Suspect firms also have significantly higher analyst following, more growth opportunities, more number of shares outstanding, and better earnings performance in the current year than non-suspect firms.

TABLE 3

The First Step of the Heckman Procedure
The Model to Correct for Potential Sample Bias

Panel A: Summary Statistics[a]

	Suspect Firm-Years (n = 16,631)		Other Firm-Years (n = 105,230)		Difference (Suspect-Other)	
	Mean	Median	Mean	Median	Mean	Median
$Habitual\_Beater_t$	2.4679	3.0000	2.1791	2.0000	0.2888***	1.0000***
$Stock\_Issuance_{t+1}$	0.6983	1.0000	0.6194	1.0000	0.0789***	0.0000***
$Analyst\_Following_t$	1.3097	1.3863	0.8204	0.0000	0.4893***	1.3863***
$MtoB_{t-1}$	4.1964	2.3823	3.4122	1.8992	0.7842***	0.4831***
$Shares_t$	3.1729	3.0836	2.6558	2.5823	0.5171***	0.5013***
ROA_t	0.0021	0.0325	−0.0369	0.0230	0.0390***	0.0095***

Panel B: Estimation Results for the Probit Model[b]

	Predicted Sign	Coefficient
Intercept		−1.6614***
$Habitual\_Beater_t$	+	0.0567***
$Stock\_Issuance_{t+1}$	+	0.0592***
$Analyst\_Following_t$	+	0.1463***
$MtoB_{t-1}$	+	0.0122***
$Shares_t$		0.0621***
ROA_t		0.0082***
Year Indicators	Yes	
Pseudo R^2 (%)	5.48	
n	121,861	

*, **, *** Represent significance at the level of 10 percent, 5 percent, and 1 percent levels, respectively.

[a] The sample period spans the years 1987–2008. The suspects are firm-years just beating/meeting zero earnings benchmark, last-year earnings, analyst forecast consensus, and management forecasts (as defined in Table 2). $Habitual\_Beater_t$ is the number of times of beating/meeting analysts' forecast consensus in the past four quarters; $Stock\_Issuance_{t+1}$ is an indicator variable that equals 1 if the firm issues equity in the next fiscal year, and 0 otherwise; $Analyst\_Following_t$ is the log of 1 plus the number of analysts following the firm; $MtoB_{t-1}$ is the market to book ratio in the prior year; $Shares_t$ is the log number of shares outstanding; and ROA_t is the return on assets, computed using net income for the rolling four quarters ending with the third quarter of year t.
The significance of the differences in the means (medians) between the suspect firms and other firms is based on t-statistics (z-statistics) from t-tests (Wilcoxon tests).

[b]
$$Prob[Suspect_t = 1] = Probit(\gamma_0 + \gamma_1 Habitual\_Beater_t + \gamma_2 Stock\_Issuance_{t+1} + \gamma_3 Analyst\_Following_t + \gamma_4 MtoB_{t-1} + \gamma_5 Shares_t + \gamma_6 ROA_t + \Sigma_k \gamma_{7,k} Year\_Indicator_{k,t} + \varepsilon_t). \quad (4)$$

Table 3, Panel B reports estimation results for the probit model. The coefficients on *Habitual_Beater*, *Stock_Issuance*, *Analyst_Following*, and *MtoB* are positive and significant at the 0.01 level. The results support the predictions, based on prior research, that firms that beat or meet earnings targets consistently in the past have a stronger incentive to do so in the current period, consistent with Bartov et al. (2002) and Kasznik and McNichols (2002). Also, firms having SEOs in the near future are more likely to be earnings management suspects, consistent with Teoh et al. (1998) and Rangan (1998). The results also support the view that firms with higher analyst coverage

are under more pressure to beat/meet earnings targets. Finally, firms with more growth opportunities are more likely to beat/meet the earnings benchmarks, consistent with Barth et al. (1999) and Skinner and Sloan (2002). Overall, the results suggest that capital market incentives are important factors in predicting earnings management suspects.

Heckman Second-Stage Results—The Trade-Off between Real Activities Manipulation and Accrual-Based Earnings Management

Table 4 reports the descriptive statistics of the variables in the main tests of the trade-off between real activities manipulation and accrual-based earnings management. Among the 16,631 suspects identified during the sample period 1987–2008 (as reported in Table 3), 13,753 have measures of real and accrual-based earnings management available. The sample size reduces to 9,826 due to the data requirements of the variables calculated using Compustat data (i.e., *Market_Share*, *ZSCORE*, *Big8*, *Audit_Tenure*, *NOA*, and *Cycle*). Finally, the availability of marginal tax rate (*MTR*) decreases the suspect sample to 6,680 firm-year observations. The data requirements are likely to bias the sample toward larger firms. All of the non-indicator variables are winsorized at the top and bottom 1 percent to eliminate extreme observations. As shown in Panel A, suspects have 3.78 percent of the market share in their industries on average. They have a *ZSCORE* of 2.750 at the 25th percentile, which is above the 2.675 cutoff point for financially distressed firms according to Altman (2000). This suggests that the majority of the sample firms are financially healthy. On average, they have an institutional ownership of 44.7 percent. Their average marginal tax rate is 30.3 percent, consistent with most being profitable. The mean value of *Big8* shows that 93.7 percent of the sample firms are audited by one of the Big 8. In terms of auditor tenure, 55.9 percent of the sample firms have had a relationship with the same auditors for more than six years. The post-SOX period accounts for 14.3 percent of the observations. The mean value of *NOA* is 51.7 percent, suggesting that around half of the sample firms have net operating assets above their corresponding industry-year median. The suspects on average have an operating cycle of 141.8 days, ROA of 4.44 percent, and market-to-book ratio of 3.58. The majority of the sample have industry-adjusted log value of assets (*Assets*) greater than 0, indicating that they are larger than the corresponding industry-year average.

Table 4, Panel B reports the Pearson and Spearman correlations among the variables in the main tests. There is a significant and positive correlation between RM_{PROD} and RM_{DISX} (Pearson correlation of 0.19), suggesting that firms use both types of real activities manipulation at the same time. Other high and significant correlations include the one between *INST* and *Assets* (Pearson correlation of 0.57), consistent with prior research that shows institutional ownership increases with firm size (e.g., O'Brien and Bhushan 1990). *MTR* is positively correlated with *ROA* (Pearson correlation of 0.58), consistent with profitable firms having higher marginal tax rates. There is also a high correlation between *Market_Share* and *Assets* (Pearson correlation of 0.43), as larger firms are likely to enjoy larger market shares in their industries.

Table 5 presents the results of the trade-off between real activities manipulation and accrual-based earnings management (i.e., Equations (5) and (6)). The estimation of the two equations is the second step of the Heckman procedure; it contains only the suspect firms and includes the inverse Mills ratio from the first stage to correct for potential sample selection bias. I use Rogers standard errors to adjust for heteroscedasticity and possible correlation among the residuals within firm clusters in estimating Equations (5) and (6) (Petersen 2009; Gow et al. 2010). The reported results use *RM*, the sum of RM_{PROD} and RM_{DISX}, as the measure for real activities manipulation.[21]

[21] When RM_{PROD} and RM_{DISX} are used as proxies for real activities manipulation, the results (untabulated) are similar to those reported in Table 5.

TABLE 4

Descriptive Statistics for Suspect Firms

Panel A: Summary Statistics[a]

Variable	n	Mean	Median	Std. Dev.	25%	75%
AM_t	6,680	0.0161	0.0157	1.2944	−0.0606	0.1083
RM_t	6,547	0.0213	0.0182	0.7653	−0.2387	0.2777
RM_{PROD_t}	6,672	−0.0684	−0.0566	0.2965	−0.2058	0.0726
RM_{DISX_t}	6,555	0.0971	0.0615	0.6448	−0.0737	0.2305
$Market\_Share_{t-1}$	6,680	0.0378	0.0066	0.0814	0.0010	0.0332
$ZSCORE_{t-1}$	6,680	6.6548	4.2748	11.4495	2.7503	6.8212
$INST_{t-1}$	6,680	0.4470	0.4620	0.2845	0.1931	0.6831
MTR_t	6,680	0.3027	0.3473	0.1000	0.3281	0.3500
$BIG8_t$	6,680	0.9370	1.0000	0.2430	1.0000	1.0000
$Audit\_Tenure_t$	6,680	0.5593	1.0000	0.4965	0.0000	1.0000
SOX_t	6,680	0.1431	0.0000	0.3502	0.0000	0.0000
NOA_{t-1}	6,680	0.5171	1.0000	0.4997	0.0000	1.0000
$Cycle_{t-1}$	6,680	141.7772	122.6805	104.0581	80.6625	177.8508
ROA_t	6,680	0.0444	0.0609	0.0952	0.0151	0.1085
$Assets_t$	6,680	1.2161	1.1027	1.9331	−0.0582	2.4613
$MtoB_t$	6,680	3.5765	2.4385	4.0392	1.4842	4.0812

(continued on next page)

TABLE 4 (continued)

Panel B: Pearson (Upper Triangle) and Spearman (Lower Triangle) Correlations[b]

	AM_t	RM_t	RM_{PROD_t}	RM_{DISX_t}	$Market\_Share_{t-1}$	$ZSCORE_{t-1}$	$INST_{t-1}$	MTR_t	$BIG8_t$	$Audit\_Tenure_t$	SOX_t	NOA_{t-1}	$Cycle_{t-1}$	ROA_t	$Assets_t$	$MtoB_t$
AM_t		0.01	**0.05**	0.00	**−0.03**	0.00	0.00	**0.02**	−0.01	0.00	**0.04**	0.01	0.01	**0.03**	0.01	0.00
RM_t	**0.03**		**0.57**	**0.88**	0.01	**−0.04**	0.00	**−0.04**	0.01	0.01	**0.02**	**0.03**	**−0.07**	**−0.07**	**0.06**	**−0.09**
RM_{PROD_t}	−0.01	**0.71**		**0.19**	**0.03**	**−0.13**	**−0.08**	**−0.10**	0.00	0.00	0.00	0.02	**−0.10**	**−0.21**	**−0.05**	**−0.16**
RM_{DISX_t}	**0.06**	**0.85**	**0.37**		0.00	0.00	**0.04**	0.00	**0.02**	0.01	**0.04**	**0.04**	**−0.03**	0.01	**0.11**	**−0.03**
$Market\_Share_{t-1}$	**−0.02**	0.01	**0.04**	0.00		**−0.07**	**0.24**	**0.16**	**0.08**	**0.17**	**0.08**	−0.01	**−0.10**	**0.11**	**0.43**	**0.02**
$ZSCORE_{t-1}$	**0.04**	**−0.16**	**−0.28**	**−0.02**	**−0.09**		−0.01	**−0.03**	0.01	**−0.05**	**−0.03**	−0.01	**0.04**	**0.06**	**−0.05**	**0.28**
$INST_{t-1}$	**0.02**	−0.01	**−0.09**	**0.05**	**0.47**	**0.07**		**0.24**	**0.16**	**0.26**	**0.33**	**0.07**	**−0.09**	**0.24**	**0.57**	0.01
MTR_t	**0.02**	**−0.02**	**−0.09**	**0.03**	**0.38**	**0.12**	**0.35**		**0.11**	**0.09**	**−0.07**	−0.01	**−0.11**	**0.58**	**0.33**	**−0.09**
$BIG8_t$	0.00	0.01	−0.01	**0.02**	**0.17**	0.01	**0.15**	**0.13**		**0.17**	**−0.12**	**0.02**	**−0.03**	**0.09**	**0.23**	−0.01
$Audit\_Tenure_t$	**0.02**	0.01	0.00	**0.03**	**0.27**	**−0.03**	**0.26**	**0.14**	**0.17**		**0.07**	0.00	0.00	**0.08**	**0.28**	**−0.02**
SOX_t	**0.03**	0.01	0.00	**0.04**	**0.07**	**−0.02**	**0.32**	**0.04**	**−0.12**	**0.07**		**0.03**	**−0.06**	0.00	**0.10**	0.01
NOA_{t-1}	**0.02**	**0.04**	**0.02**	**0.05**	**−0.02**	**−0.20**	**0.07**	0.01	**0.02**	0.00	**0.03**		**0.25**	**−0.10**	**0.11**	**−0.12**
$Cycle_{t-1}$	**0.05**	**−0.13**	**−0.15**	**−0.09**	**−0.11**	**−0.02**	**−0.03**	**−0.04**	−0.01	**0.02**	**−0.07**	**0.27**		**−0.14**	**−0.04**	**0.02**
ROA_t	**0.05**	**−0.17**	**−0.31**	−0.01	**0.19**	**0.56**	**0.19**	**0.35**	**0.07**	**0.05**	0.00	**−0.17**	**−0.06**		**0.25**	**−0.05**
$Assets_t$	**0.05**	**0.07**	**−0.05**	**0.16**	**0.65**	**−0.03**	**0.60**	**0.37**	**0.23**	**0.29**	**0.10**	**0.11**	0.00	**0.16**		**0.06**
$MtoB_t$	**0.06**	**−0.14**	**−0.28**	0.00	0.01	**0.49**	**0.14**	**0.13**	**0.03**	**−0.02**	**0.06**	**−0.13**	**−0.05**	**0.42**	**0.18**	

[a] AM_t is the estimated residuals from the following industry-year regression:

$$Accruals_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(\Delta S_t/A_{t-1}) + \alpha_3(PPE_t/A_{t-1}) + \varepsilon_t;$$

RM_{PROD_t} is the estimated residuals from the following industry-year regression:

$$PROD_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(S_t/A_{t-1}) + \alpha_3(\Delta S_t/A_{t-1}) + \alpha_4(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t;$$

RM_{DISX_t} is the estimated residuals from the following industry-year regression multiplied by −1:

$$DISX_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(S_{t-1}/A_{t-1}) + \varepsilon_t;$$

RM_t is the sum of RM_{PROD_t} and RM_{DISX_t}; $Market\_Share_{t-1}$ is the percentage of the company's sales to the total sales of its industry at the beginning of year t, where industry is defined based on three-digit SIC codes following Harris (1998); $ZSCORE_{t-1}$ is the z-score at the beginning of year t, where:

$$ZSCORE_t = 0.3(NI_t/Asset_t) + 1.0(Sales_t/Asset_t) + 1.4(Retained\ Earnings_t/Asset_t) + 1.2(Working\ Capital_t/Asset_t) + 0.6([Stock\ Price \times Shares\ Outstanding_t]/Total\ Liabilities_t);$$

(continued on next page)

TABLE 4 (continued)

$INST_{t-1}$ is the percentage of institutional ownership at the beginning of year t; MTR_t is the marginal tax rates developed and provided by Professor John Graham (http://faculty.fuqua.duke.edu/~jgraham/); $BIG8_t$ is an indicator variable that equals 1 if the firm's auditor is one of the Big 8, and 0 otherwise; $Audit\_Tenure_t$ is an indicator variable that equals 1 if the number of years the auditor has audited the client is above the sample median of six years, and 0 otherwise; SOX_t is an indicator variable that equals 1 if the fiscal year is after 2003, and 0 otherwise; NOA_{t-1} is an indicator variable that equals 1 if the net operating assets (i.e., shareholders' equity less cash and marketable securities and plus total debt) at the beginning of the year divided by lagged sales is above the median of the corresponding industry-year, and 0 otherwise; $Cycle_{t-1}$ is the days receivable plus the days inventory less the days payable at the beginning of the year; ROA_t is the return on assets, computed using net income for the rolling four quarters ending with the third quarter of year t; $Assets_t$ is the industry-adjusted log value of total assets; and $MtoB_t$ is the market-to-book ratio.

[b] Bolded coefficients are statistically significant at the 0.1 level.

TABLE 5

The Second Step of the Heckman Procedure
The Trade-Off between Real Activities Manipulation and Accrual-Based Earnings Management

	***RM* Equation (n = 6,547)**		***AM* Equation (n = 6,547)**	
	Pred. Sign	**Coefficient**	**Pred. Sign**	**Coefficient**
Intercept		−0.4810***		1.7314***
Unexpected RM_t			−	−0.2471***
Costs Associated with Real Activities Manipulation				
$Market\_Share_{t-1}$	+	1.1005***	−	−4.0566***
$ZSCORE_{t-1}$	+	0.0145***	−	−0.0467***
$INST_{t-1}$	−	−0.0618*	+	0.1366**
MTR_t	−	−0.2955***	+	1.2369***
Costs Associated with Accrual-Based Earnings Management				
$BIG8_t$	+	0.0465	−	−0.2472***
$Audit\_Tenure_t$	+	0.0083	−	−0.0643**
SOX_t	+	0.1971**	−	−0.6181***
NOA_{t-1}	+	0.0367**	−	−0.0967***
$Cycle_{t-1}$	−	−0.0006***	+	0.0020***
Control Variables				
ROA_t		0.0270***		−0.1479***
$Assets_t$		0.0433***		−0.1358***
$MtoB_t$		−0.0024		0.0055
$Earn_t$		−0.0040***		
$Pred\_RM_t$				3.0727***
IMR_t		0.3642***		−1.2699***
Year indicators		Yes		Yes
F-statistic	H1a, H1b	***	H1c–H1f	***
Adj. R^2 (%)		23.49		30.36

*, **, *** Represent significance at the level of 10 percent, 5 percent, and 1 percent levels, respectively.
The following regressions are estimated for the sample period 1987–2008 using cross-sectional and time-series data with firm-level clustered standard errors for the estimation of the p-values:

$$RM_t = \beta_0 + \Sigma_k \beta_{1,k} Cost\ of\ RM_{k,t} + \Sigma_l \beta_{2,l} Cost\ of\ AM_{l,t} + \Sigma_m \beta_{3,m} Control_{m,t} + u_t. \quad (5)$$

$$AM_t = \gamma_0 + \Sigma_k \gamma_{1,k} Cost\ of\ AM_{k,t} + \Sigma_l \gamma_{2,l} Cost\ of\ RM_{l,t} + \gamma_3 Unexpected\ RM_t + \Sigma_m \gamma_{4,m} Control_{m,t} + v_t, \quad (6)$$

where RM_t is the sum of $RM_{PROD,t}$ and $RM_{DISX,t}$ (as defined in Table 1); AM_t is the estimated residuals from the following industry-year regression:

$$Accruals_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \alpha_2(\Delta S_t/A_{t-1}) + \alpha_3(PPE_t/A_{t-1}) + \varepsilon_t;$$

Unexpected RM_t is the estimated residuals from Equation (5); $Market\_Share_{t-1}$ is the percentage of the company's sales to the total sales of its industry at the beginning of year t, where industry is defined based on three-digit SIC codes (following Harris 1998); $ZSCORE_{t-1}$ is the z-score at the beginning of year t, where $ZSCORE_t$ is:

$$0.3(NI_t/Asset_t) + 1.0(Sales_t/Asset_t) + 1.4(Retained\ Earnings_t/Asset_t) + 1.2(Working\ Capital_t/Asset_t) + 0.6([Stock\ Price \times Shares\ Outstanding_t]/Total\ Liabilities_t);$$

(continued on next page)

TABLE 5 (continued)

$INST_{t-1}$ is the percentage of institutional ownership at the beginning of year t; MTR_t is the marginal tax rate, developed and provided by Professor John Graham (http://faculty.fuqua.duke.edu/~jgraham/); $BIG8_t$ is an indicator variable that equals 1 if the firm's auditor is one of the Big 8, and 0 otherwise; $Audit\_Tenure_t$ is an indicator variable that equals 1 if the number of years the auditor has audited the client is above the sample median of six years, and 0 otherwise; SOX_t is an indicator variable that equals 1 if the fiscal year is after 2003, and 0 otherwise; NOA_{t-1} is an indicator variable that equals 1 if the net operating assets (i.e., shareholders' equity less cash and marketable securities and plus total debt) at the beginning of the year divided by lagged sales is above the median of the corresponding industry-year, and 0 otherwise; $Cycle_{t-1}$ is the days receivable plus the days inventory less the days payable at the beginning of the year; ROA_t is the return on assets, computed using net income for the rolling four quarters ending with the third quarter of year t; $Assets_t$ is the industry-adjusted log value of total assets; $MtoB_t$ is the market-to-book ratio; $Earn_t$ is the earnings before extraordinary items minus discretionary accruals and production costs, plus discretionary expenditures; $Pred_{RM,t}$ is the predicted values of Equation (5); and IMR_t is the estimated as $\varphi(z)/\Phi(z)$, where z is the fitted value of the following probit regression index function, φ is the density function for standard normal distribution, and Φ is the cumulative density function for standard normal distribution:

$$Prob[Suspect_t = 1] = Probit(\gamma_0 + \gamma_1 Habitual\_Beater_t + \gamma_2 Stock\_Issuance_{t+1} + \gamma_3 Analyst\_Following_t + \gamma_4 MtoB_{t-1} + \gamma_5 Shares_t + \gamma_6 ROA_t + \Sigma_k \gamma_{7,k} Year\_Indicator_{k,t} + \varepsilon_t).$$

Although not directly hypothesized, both *RM* and *AM* are expected to be negatively related with their own cost determinants. The results are consistent with this expectation. In the *RM* equation, the coefficients on *Market_Share* and *ZSCORE* are positive and significant at the 0.01 level, indicating that firms enjoying larger market shares and better financial health engage in higher levels of real activities manipulation. This finding is consistent with managers in these firms perceiving themselves as having more flexibility to deviate from optimal business decisions due to their competitive advantage in the industry or their healthy financial condition. The coefficient on *INST* is negative, as predicted (significant at the 0.1 level), indicating that institutional investors exert more pressure on firms to constrain real activities manipulation than accrual-based earnings management. The coefficient on *MTR* is negative and significant at the 0.01 level, consistent with firms with higher marginal tax rates finding real activities manipulation more costly.

For the *AM* equation, the results show that all of the costs associated with accrual-based earnings management have significant coefficients (at least at the 0.05 level) with the predicted signs. The coefficients on *Big8* and *Audit_Tenure* are negative, indicating that audit firms with a higher reputation, and auditors with longer tenure, are more likely to constrain firms' attempts to manage earnings with accrual accounts. The coefficient on *SOX* is negative, suggesting that accrual-based earnings management decreases in the post-SOX period, probably due to heightened regulatory scrutiny (Cohen et al. 2008). The negative coefficient on *NOA* and the positive coefficient on *Cycle* indicate that accrual-based earnings management is constrained by firms' accounting flexibility; that is, firms with a bloated balance sheet due to accrual manipulation in prior years and firms with shorter operating cycles have less accounting flexibility to inflate accruals and incur higher costs in doing so.

H1 predicts that the trade-off between real activities manipulation and accrual-based earnings management is based on the relative costliness of the two activities. Specifically, H1a and H1b predict that firms with higher costs associated with accrual-based earnings management will make more use of real activities manipulation. Consistent with H1a, in the *RM* equation, the coefficient on *SOX* is positive and significant at the 0.05 level, suggesting that real activities manipulation increases due to the higher level of scrutiny of accounting practice after the passage of SOX. Consistent with H1b, the positive coefficient on *NOA* (significant at the 0.05 level) and the negative coefficient on *Cycle* (significant at the 0.01 level) indicate that firms with less accounting flexibility due to accrual manipulation in prior years or shorter operating cycles use real activities manipulation more. The results do not indicate that real activities manipulation increases with *Big8*

and *Audit_Tenure*. The insignificant coefficient on *Big8* could be due to the fact that 93.7 percent of the sample firms use the Big 8. The insignificant result for *Audit_Tenure* could be because auditor independence reduces with tenure, as suggested by Beck et al. (1988) and Lys and Watts (1994). A partial F-test of H1a and H1b yields the result that the costs associated with accrual-based earnings management are significant (at the level of 0.01) in explaining the level of real activities manipulation.

H1c to H1f predict that firms use relatively more accrual-based earnings management when the costs associated with real activities manipulation are higher. In the *AM* equation, the coefficients on the four costs associated with real activities manipulation have the predicted signs and are significant at least at the level of 0.05. The negative coefficients on *Market_Share* and *ZSCORE* suggest that firms with a leader status in the industry and with a healthy financial condition have more flexibility for real activities manipulation and, thus, use accrual-based earnings management less. The positive coefficient on *INST* is consistent with institutional investors imposing more constraint and scrutiny over real activities manipulation than accrual-based earnings management, probably due to the longer-term real consequences of the former on firm values. Hence, firms with higher institutional ownership use the latter strategy more. Finally, *MTR* has a positive coefficient, also consistent with the prediction that when real activities manipulation becomes more costly because of the greater current-period tax consequences, firms switch to using accrual-based earnings management. The partial F-test of H1c to H1f also confirms that the costs of real activities manipulation explain the level of accrual-based earnings management (F-statistic significant at the 0.01 level).

H2 predicts a direct substitutive relation between real and accrual-based earnings management. This can be observed if managers use less (more) accrual-based earnings management if the real activities manipulation during the year turns out to be unexpectedly high (low), which implies a negative relation between accrual-based earnings management and the unexpected amount of real activities manipulation realized. Consistent with H2, in the *AM* equation, the coefficient on *Unexpected RM* is negative and significant at the 0.01 level. The result for H2, combined with the results for H1, suggests sequential decisions are being made about the use of the two approaches. That is, managers determine the level of real activities manipulation based on the cost factors observable before the fiscal year-end, and adjust the level of accrual-based earnings management after the fiscal year-end based on the realized level of real activities manipulation.

Finally, Table 5 shows that the coefficients on *IMR* in the *RM* and *AM* equations are significant at the 0.01 level, confirming the importance of correcting for sample selection bias. The coefficient on the control variable, *Pred_RM*, is positive and significant at the 0.01 level, consistent with the positive correlation between the two activities due to the cross-sectional variation in the total amount of desired earnings management activities.

In summary, using a sample of earnings management suspects, I find results consistent with managers trading off the two earnings management strategies in two ways. First, they tradeoff the two strategies based on the relative costs to their firms. If firms operate in an environment where real activities manipulation is constrained due to their less-competitive status in the industry, less-healthy financial condition, higher level of scrutiny from institutional investors, and higher marginal tax rates, then they will use accrual-based earnings management more and real activities manipulation less. If firms' accounting practice is constrained due to heightened regulatory scrutiny, prior periods' accrual manipulation, and shorter operating cycles, then the converse will be true. Second, managers substitute the two strategies directly. The amount of accrual-based earnings management decreases (increases) when the outcome of real activities manipulation turns out to be too high (low), supporting the hypothesis that managers adjust the level of accrual-based earnings management based on the real activities manipulation realized at the fiscal year-end.

An Additional Test for the Sequence of the Decisions

The main tests assume that managers can adjust accrual-based earnings management after real activities manipulation is realized by the fiscal year-end. This assumption is made based on the different nature of the two strategies. Real activities manipulation changes the execution of a transaction that takes place during the fiscal year, whereas accrual-based earnings management changes the presentation of a given transaction in the financial statements, which can be done after the fiscal year-end.

An alternative assumption is that managers determine the levels of the two earnings management strategies simultaneously during the fiscal year and do not adjust accrual accounts after the fiscal year-end. Several prior studies implicitly use this assumption and model multiple earnings management strategies with simultaneous equation systems (Beatty et al. 1995; Hunt et al. 1996; Gaver and Paterson 1999; Barton 2001; Pincus and Rajgopal 2002). To test whether this assumption can be applied to managers' trade-off decisions, I conduct the Hausman test (Hausman 1978) to examine whether the levels of the two earnings management activities behave as endogenous variables that are simultaneously determined. Specifically, in the first stage, I regress *AM* and *RM* on the exogenous variables (i.e., the costs associated with the two earnings management approaches and the control variables) in the equation system and obtain instruments for *AM* and *RM* as the predicted values from the first-stage regressions. In the second stage, I regress *AM* on the exogenous variables, the instrument of *RM* and *RM* itself. If *RM* is determined before *AM*, then it should be exogenous in the *AM* equation. The untabulated result shows that the coefficient on the instrument of *RM* is not significantly different from zero, which means that the Hausman test fails to reject the exogeneity of *RM* in the *AM* equation. In contrast, the Hausman test rejects the exogeneity of *AM* in the *RM* equations. Specifically, when regressing *RM* on the exogenous variables, the instrument of *AM* and *AM* itself, the coefficient on the instrument of *AM* is significant, suggesting that *AM* is correlated with *RM* equation's error term. This finding is consistent with *AM* being determined partially by the level of realized real activities manipulation. In summary, the results from the Hausman test are consistent with that *RM* and *AM* are determined sequentially, with *RM* preceding *AM*.

VI. CONCLUSIONS

This study provides large-sample evidence for how managers trade off real activities manipulation and accrual-based earnings management over the period 1987–2008. The real activities manipulation I examine includes overproducing inventory and cutting discretionary expenditures (including R&D, advertising, and SG&A expenditures). I use the cross-sectional models developed by Roychowdhury (2006) to estimate the abnormal levels of real transactions as the proxies for real activities manipulation.

I contribute to the earnings management literature by showing that managers' trade-off decisions are influenced by the costs and timing of earnings management activities. First, the results are consistent with managers trading off earnings management methods based on their relative costliness. I find that, when accrual-based earnings management is constrained due to a higher level of scrutiny of accounting practice post-SOX, and limited accounting flexibility because of accrual manipulation in prior years and shorter operating cycles, firms use real activities manipulation (accrual-based earnings management) to a greater (lesser) extent. The results also indicate that firms use more accrual-based earnings management and less real activities manipulation when the latter is more costly for them, due to having a less competitive status in the industry, being in a less healthy financial condition, experiencing higher levels of monitoring from institutional investors, and incurring greater tax expenses in the current period. Second, the results indicate a direct substitutive relation between real activities manipulation and accrual-based earnings management; the level of

the latter is negatively related to the unexpected amount of the former realized at the fiscal year-end. This suggests that, after the fiscal year-end, managers fine-tune their accrual accounts based on the outcomes of real activities manipulation, consistent with the sequential nature of the two activities. Additional Hausman tests also show results consistent with the sequential decisions.

My finding that managers treat real activities manipulation and accrual-based earnings management as substitutes has implications for both researchers and regulators. For researchers, this substitutive relation suggests that focusing on accrual manipulation exclusively does not fully explain earnings management activities. For regulators, it implies that increasing scrutiny or constraints over accounting discretion does not eliminate earnings management activities altogether, but only changes managers' preference for different earnings management strategies, some of which (such as real activities manipulation) can be more costly for investors.

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