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Earnings Management by Firms in the SEC's Pilot Program

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Abstract

Using a sample of firms selected in a pilot program of the SEC regulation SHO, we investigate whether managers make trade-off decisions between accrual-based earnings management and real activities manipulation over the period 2000-2015. We follow prior literature to calculate real activities manipulations (RAEM) and discretionary accruals (ABEM). Subsequently, utilizing these calculations we examine trade-off decisions by management in the specific settings of this paper. We find that managers of pilot firms do not make strong sequential decisions about the use of accrual-based earnings management versus real activities manipulation and their decisions do not fully depend on the relative costliness of earnings management. While prior studies provide evidence on short-selling firms and accrual management, no prior study has examined trade-off decisions between RAEM and ABEM for pilot firms, particularly during the pilot program.

Keywords: accrual-based earnings management, real activities manipulation, trade-off, pilot firms, SEC regulation SHO.

I. INTRODUCTION

Management practice of earnings manipulation has attracted significant attention of researchers, regulators, auditors, and investors due to its direct effect on financial reporting quality. In general, there are two channels of managing earnings: accrual-based earnings management (ABEM) and real activities earnings management (RAEM). Most previous studies examine earnings management behavior from the accrual-based perspective. Only a few studies consider both types of earnings management and examine the costs and trade-off decisions between them (e.g., Cohen et al., 2008; Cohen & Zarowin, 2010; Zang, 2012; and Cunningham et al., 2020).

Empirical evidence documents that short sellers not only detect earnings management and fraudulent activities prior to public disclosure, but also play a disciplining role in earnings management (Desai et al., 2006; Karpoff & Lou, 2010; Massa et al., 2015; and Fang et al., 2016). Numerous anecdotal reports in the business press indicate that the prospect of short selling activity is of high concern to management due to direct impact on the cost of equity and thus, leading to disciplining management reflected in reduction in earnings management and M&A activity (Fang et al., 2016; Shi et al., 2021). In this paper we attempt to elucidate the discipling role of short sellers and examine management trade-off decisions between real and accrual-based earnings management when faced with prospects of short selling activity. The SEC pilot program (regulation SHO with the rule 202T) provides ideal setting for randomized experiment

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resulting from exogenous shock to the stock market[1] (Fang et al., 2016). Random selection of the firms participating in the program allows us to compare pilot and non-pilot firms to reduce reverse causality concerns and confounding events while controlling for time-trends. Whereas the prospect of short selling may be viewed as a constraint for firms to use accruals to manage earnings, it is not clear how the likelihood of short selling affects the trade-off between ABEM and RAEM. To the best of our knowledge, no previous studies have examined management trade-off decisions in this setting (pilot program) to determine whether the discipling role of short sellers apply to both types of earnings manipulations, and whether they are used by management as substitutes (Zang, 2012).

Management response to short sellers' actions is relatively under researched area, especially from the accounting perspective. However, recent research in that area underscores the importance of empirical evidence in this area. Short sellers are found to influence management demand for audit quality (Skomra et al., 2022), affect market reaction based on management response (or lack thereof) to the research reports claiming that the target firm is overvalued (Jiang et al., 2020; Brendel & Ryans, 2021), and affect corporate payout policies (Chen et al., 2019).

Previous studies find that firms are more inclined to engage in earnings management when their earnings just beat/meet previous year's earnings and when they want to meet these benchmarks in the current year. We define these firms as "suspects" based on three criteria described later in the paper, as the purpose of the study is not to test if firms engage in any type of earnings management behavior, rather - if there is a trade-off between them. We test our hypothesis using a sample of firms that were chosen in the pilot program (pilot firms), and a sample of control firms (non-pilot firms) over the period 2000-2015. We find that pilot firms consider only selected costs when determining on the method of earnings management. The results suggest that managers of pilot firms with heightened short selling threats do not make strong sequential decisions using accrual-based earnings management strategies. Contrary to that, we find that the management of non-pilot firms does make sequential decisions and adjust ABEM at the year-end based on the level of RAEM activities throughout the year.

This study is motivated by the need to expand research on earnings management behavior for firms with short selling prospects. Since short selling continuously attracts considerable attention, we believe that examining earnings management mechanisms at these firms remains vital for regulators, investors, and auditors. Building upon empirical evidence that short sellers induce management to decrease earnings management activity, we explore what trade-off decisions are made in that setting.

This study contributes to the two streams of literature - short selling activities and earnings management. Foremost, it complements Zang (2012) and Fang et al. (2016) and studies by disentangling the effect of short sellers on earnings management from two channels approach (ABEM and RAEM). This study enhances our understanding of earnings management mechanisms for this specific group of firms. It sheds additional light on findings from Zang (2012) as it suggests that prospects of short selling should

[1] The SEC mandated a pilot program in July 2004 as part of the rule 202T regulation SHO. Based on this regulation, every third stock in the Russell 3000 index was exempt from short-price test for the period of May 2, 2005, to July 6, 2007. The purpose of short-price test was to prevent stocks from short selling pressures once the stock already dropped more than 10 percent in a day as compared to the previous day closing price. Therefore, stocks selected in the pilot program were traded without any restrictions of short sale price test.

be strongly considered when interpreting findings from that study. Furthermore, this paper contributes to the long-standing debate on the costs and benefits of short selling activities that is of interest to regulators and management concerned with high short interest positions in their firms. The evidence provided in this study contributes to the literature on the monitoring role of short sellers over management financial reporting behavior which could help audit firms evaluate audit risk at these clients.

The remainder of this paper is organized as follows: in section 2 we review prior studies in this area and develops hypotheses. In section 3 we describe the research methods to test hypotheses and review the data with a sample selection process. In section 4 we discuss the empirical results and additional sensitivity analysis. Section 5 summarizes findings in the paper.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Earnings management behavior is motivated by various factors – management's compensations incentives, meeting market expectations, or reduction in the cost of equity (Graham et al., 2005). Generally, earnings management techniques are divided into two categories: ABEM and RAEM as each comes with different costs to the company (Gunny, 2010). Most of the research examines ABEM as the primary strategy for manipulating earnings (Jones, 1991; Leuz et al., 2003); however, both techniques should be considered to correctly draw conclusions on the determinants and effects of this behavior (Cunningham et al., 2020). In pioneer study on RAEM, Roychowdhury (2006) presents evidence that management uses various RAEM techniques (e.g., overproduction, reduction of discretionary expenditures) to avoid annual losses reporting and to meet analyst forecasts. The literature examining the trade-offs between two methods is incipient. Zang (2012) finds that as the cost of ABEM increases, managers are inclined to engage in RAEM to achieve anticipated earnings outcome and vice versa (trade-off based on how costly each method is). Similarly, Cohen and Zarowin (2010) suggest that firms use RAEM to a greater extent than ABEM to avoid underpricing of seasoned equity offerings. Furthermore, the implementation of SOX by US firms and the adoption of IFRS by Greek companies increase the shift from ABEM to RAEM (Cohen et al., 2008; Ferentinou & Anagnostopoulou, 2016). Furthermore, trade-off in the methods is also evidenced when external monitoring mechanisms are in place – the receipt of the (Lenard et al., 2016).

Short sellers identify overpriced firms based on financial disclosures and private information (Ljungqvist & Qian, 2016). The costs and risks associated with short positions imply that only investors with sophisticated abilities to analyze private and publicly available information will engage in short sales to make profits (Diamond & Verrecchia, 1987). In general, the SEC aims to prevent short sellers from driving stock prices down more than 10 percent in value in a trading day. To achieve that goal, the SEC conducts short sale price tests on a regular basis ("tick" tests). However, to test the effect of these price tests, the SEC mandated a temporary rule (rule 202T of the regulation SHO), which exempted a group of stocks (every third stock from the Russell 3000 index) from tick test to examine how lack of restrictions affects short trading activity. Thus, it decreased the cost of short selling activities for firms exempted from tick test under the pilot program, as compared to non-pilot firms.

The significant role of short sellers in the capital markets has triggered recent research on their role on the corporate decisions. De Angelis et al. (2017) found that firms grant more stock options to managers and adopt anti-takeover provisions when short sellers' constrains are removed. Chen et al. (2019) documents increased dividends

payout but not stock repurchase to prevent short selling activities. Prior literature provides evidence on the disciplining role of short sellers on earnings management. Park (2017) shows evidence for a positive association between real EM and future short interest. Fang et al. (2016) explored the link between short selling and financial reporting quality during the SEC pilot program. They provide evidence that prospects of short selling discourage accrual-based earnings management and consequently, improve financial reporting quality and stock price efficiency. However, earnings management returns to the same levels at the end of the program when the prospects of short selling decrease. Furthermore, the disciplining role of short sellers is proved by the comprehensive examination of the relation between the threat of short selling and earnings management from the global perspective using data from thirty-three countries (Massa et al., 2015).

Considering the significance of the earnings management issue and the limited studies on the use of both strategies by firms, it is important to offer additional evidence on the trade-off decision between pilot firms. To the best of our knowledge, no previous studies have examined earnings management trade-off by pilot firms that were selected in the pilot program (pilot firms) and the group of firms exempted from short-sale price tests (non-pilot firms). Building on the empirical evidence presenting a disciplining effect, we examine whether firms (pilot and non-pilot) are cost conscious when choosing a specific method of earnings management. Additionally, following Zang (2012) we test whether these firms make sequential decisions between the two strategies by adjusting the level of ABEM at the year-end based on the achieved level of RAEM throughout the year.

Management decision on the use of specific method depends on the firm's accounting and regulatory environment which determines the cost of each method. The application of RAEM reflects a different approach from normal (optimal) operational practices and costs more to the company in the long run. It is operationalized by delaying or reducing discretionary expenditures or acceleration of inventory production. On the contrary, ABEM involves the manipulation of accruals at the year-end and is more likely scrutinized by the SEC, auditors, or short sellers. As one CFO states, "While auditors can second-guess the firm's accounting policies, they cannot readily challenge real economic actions to meet earnings targets that are taken in the ordinary course of business" (Graham et al., 2005, p. 36). The extent of ABEM may also depend on how successful mangers are in utilizing operating activities to meet earnings goals (Zang, 2012). Therefore, while the shock of Regulation SHO led to better external monitoring and lower ABEM (Fang et al., 2016), it is not known whether this will trigger pilot firms to move to RAEM instead, and whether this decision is dependent upon cost of each method. On one hand, the threat of short selling may raise cost awareness between managers to shift earnings management practice with lower costs. Pilot firms have higher risk of short selling activity owing to exemption by the SEC from short selling price tests. Thus, management may experience heightened pressure from short sellers which could potentially lead to increased cost awareness when evaluating methods of earnings manipulation. On the other hand, it is likely that costs of earnings management will not be relevant to management as the main goal for them is to limit short selling exposure at all costs. Prior research shows that both methods are substitutes (Zang, 2012; Fang et al., 2016; and Cunningham et al., 2020) in terms of relative costs. However, in this specific setting, when firms face increased threat from short sellers, the evidence can provide otherwise. In general, RAEM activity is difficult to scrutinize by audit firm or regulator, however, short sellers due to their sophisticated skills might be able to better detect

RAEM. Thus, the costs of RAEM may not be relevant for management when faced with increased short selling prospects. Based on the above arguments, we form the following hypothesis in a null form:

H_1: for the pilot firms, the decision between accrual-based earnings management versus real activities manipulation does not depend on the relative costs of each method during the SEC pilot period.

III. RESEARCH METHODOLOGY

3.1. Research Design and Sample Selection

We measure RAEM following Roychowdhury (2006) by computing abnormal production costs and the reduction in discretionary expenditures (equation 1 and 2 respectively):

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

$$\frac{DISX_t}{A_{t-1}} = \alpha_0 + \alpha_1\left(\frac{1}{A_{t-1}}\right) + \alpha_2\left(\frac{S_{t-1}}{A_{t-1}}\right) + \varepsilon_t \quad \text{.....} \quad 2$$

The above equations are estimated cross-sectionally for each industry-year using the Fama-French 48 industry classification (Fama & French, 1997). The estimated residuals from the above equations represent abnormal level of production expenses and discretionary expenditures, respectively. The higher the estimated residual (equation 1), the greater inventory being overproduced and the greater increase in earnings through reduction in the average cost of goods sold. Higher values of the abnormal level of discretionary expenditures (residual from equation 2, multiplied by negative one) suggest firms reduce discretionary expenditure to increase earnings. The aggregate measure of RAEM is calculated as the sum of both estimated residuals.

Discretionary accruals capturing ABEM are measured as the difference between actual accruals and the normal level of accruals. The normal level of accruals is derived using the modified Jones (1991) model (equation 3), estimated cross-sectionally for industry-years.

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

Appendix A
Variable Definitions

$PROD_t$	The sum of the cost of goods sold in year t and the change in inventory from t-1 to t
$DISX_t$	The sum of R&D, advertising, and SG&A expenditures in year t
$Accruals_t$	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 & Hribar (1999))
A_{t-1}	The total assets in year t-1
S_t	The net sales in year t
ΔS_t	The change in net sales from year t-1 to t
ΔS_{t-1}	The change in net sales from year t-2 to t-1
PPE_t	Gross property, plant, and equipment
First stage	
$Suspect_t$	Equals 1 if a firm just beats/meets one of the earnings benchmarks (the prior year's earnings, zero earnings, and analyst), and 0 otherwise
Habitual $Beater_t$	The number of times of beating/meeting analysts' forecast consensus in the past four quarters
Stock $Issuance_{t+1}$	Equals 1 if the firm issues equity in the next year, and 0 otherwise.
$Analyst\_Following_t$	The log of 1 plus the number of analysts following the firm
$MtoB_{t-1}$	Market-to-book ratio at the beginning of the year

To be continued Appendix A.

First stage	
Shares$_t$	The log number of shares outstanding
ROA$_t$	Net income for the rolling four quarters ending with the third quarter of year t
Second stage	
RAEM$_t$	Is the sum of RAEM_PROD$_t$ and RAEM_DISX$_t$
ABEM$_t$	Are the estimated residuals from the regressions in equation 3
Market Share$_{t-1}$	The ratio of a company's sales to the total sales of its industry
ZSCORE$_{t-1}$	0.3(Net Income/Asset)+1.0(Sales/Asset)+1.4(Retained Earnings/ Asset)+1.2(Working Capital/Asset)+0.6(Stock Price*Share Outstanding/ Total Liabilities)
INST$_{t-1}$	The percentage of institutional ownership at the beginning of year t
MTR$_t$	The firms' marginal tax rates developed and provided by Professor John Graham: http://faculty.fuqua.duke.edu/;jgraham
Big8$_t$	Equals one if whether the firm's auditor is one of the Big 8 audit forms, and 0 otherwise
Tenure$_t$	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$_t$	Equals 1 if the fiscal year is after 2003, and 0 otherwise
NOA$_{t-1}$	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, developed by Barton & Simko (2002).
Cycle$_{t-1}$	The days receivable plus the day's inventories less the days payable at the beginning of the year, as defined by Dechow (1994).
IMR$_t$	The inverse Mills ratio (IMR) from the first step of the Heckman procedure to correct for the potential sample bias
ROA$_t$	Net income for the rolling four quarters ending with the third quarter of the year
Asset$_t$	Industry-adjusted log value of total assets
MtoB$_t$	The market-to-book ratio
Earn$_t$	The real activities manipulation equation pre-managed earnings, developed by Beatty et al. (1995) and Hunt et al. (1996)
Pred_RAEM$_t$	The predicted amount of real activities manipulation from equation (5)
Unexpected_ RAEM	Estimated residuals from equation 5.
RAEM_Instrument$_t$	Expected values of RM from equation 5
ABEM_Instrument$_t$	Expected values of AM from equation 6

The sample of firms used in the paper is obtained from Compustat database, which contains financial information necessary to calculate accruals capturing earnings management. Following prior studies, we exclude firms from financial and regulated industries. Additional information required for the models is obtained from CRSP and IBES databases. We define suspect firms for the sample as firms which are likely to have engaged in earnings management based on specific earnings criteria. These firms need to have earnings at or right above any of the following three benchmarks: earnings that are zero, analyst consensus forecast, and last year earnings per share. Next, we group these firms into suspect pilot and suspect non-pilot firms, based on whether they were selected in the pilot program[2].

[2] https://www.sec.gov/spotlight/shopilot.htm.

Due to the non-random sample selection of suspect pilot and suspect non-pilot firms, we perform Heckman's (1979) two-step procedure. This procedure is used to correct for potential sample selection bias and to help mitigate endogeneity issues. In the first step, we estimated for the full sample the probability of a firm just beating/meeting one of the earnings benchmarks (i.e., zero earnings, analyst consensus forecast, and the previous year's earnings) to obtain the inverse Mills ratio (IMR) as shown in the model below (equation 4). In the second step, IMR is included in the main models as a control variable.

$$\begin{aligned}\textbf{Prob[Suspect}_t\textbf{= 1]= Probit(}&\gamma_0+\gamma_1\textbf{Habitual Beater}+\gamma_2\textbf{Stock\_Issuance}_{t+1}\\&+\gamma_3\textbf{AnalystFollowing}_t+\gamma_4\textbf{MtB}_{t-1}+\gamma_5\textbf{Shares}_t+\gamma_6\textbf{ROA}_t\\&+\textstyle\sum_k\gamma_{7,k}\textbf{Year Indicator}_{k,t}+\varepsilon_t \quad \textbf{.....} \quad \textbf{4}\end{aligned}$$

Model (5) and (6) specified below are used for our main analysis to estimate the trade-off based on the relative costs of RAEM versus ABEM:

$$\begin{aligned}\textbf{RAEM}_t=\ &\beta_0+\textstyle\sum_t\beta_{1,k}\textbf{Cost of RAEM}_{k,t}+\sum_t\beta_{2,1}\textbf{Cost of ABEM}_{l,t}\\&+\textstyle\sum_m\beta_{3,m}\textbf{Control}_{m,t}+\mu_t \quad \textbf{.....} \quad \textbf{5}\\ \textbf{ABEM}_t=\ &\gamma_0+\textstyle\sum_t\gamma_{1,k}\textbf{Cost of ABEM}_{k,t}+\sum_t\gamma_{2,1}\textbf{Cost of RAEM}_{l,t}\\&+\gamma_3\textbf{UnexpectedRAEM}_t+\textstyle\sum_m\beta_{4,m}\textbf{Control}_{m,t}+\mu_t \quad \textbf{.....} \quad \textbf{6}\end{aligned}$$

Following Zang (2012), we use four variables to measure the costs of RAEM - Market_Share, ZSCORE, marginal tax rate (MTR) and institutional ownership (INST). The higher the values of Market_Share, and ZSCORE, the lower the cost of RAEM; thus, we expect positive coefficient on β_1 and β_2. Higher values of institutional ownership (INST) and marginal tax rate (MTR) indicate higher costs for real activities manipulation; thus, the coefficients on β_3 and β_4 in equation (5) are expected to be negative.

To measure the cost associated with ABEM we use five variables – Big8, Tenure, SOX, NOA, and Cycle. Generally, we expect one of the large audit firms (Big8), with long term client tenure (Tenure), and the post-SOX period (SOX) to discourage ABEM activity. Net operating assets (NOA) (a proxy for prior year accrual management), and operating cycle (Cycle) determine accounting flexibility allowing managers for greater flexibility to use ABEM. Therefore, we expect positive (negative) relationship between ABEM and NOA (Cycle), respectively.

Additionally, both models use other control variables, including IMR_t from the first step of the Heckman procedure and year indicator variables. Also, the predicted value of real activities manipulation from equation (5), Unexpected_RAEM is included in equation (6) to control for income-increasing activities resulting from earnings management.

IV. RESULTS AND DISCUSSION

4.1. Empirical Results

Table 1 panel A presents results for the normal levels of production costs, discretionary expenditures, and accruals based on equations (1) to (3), respectively. Following Zang (2012), we estimate these three equations for each industry-year based on Fama-French 48 industry classification. All variables are winsorized at one percent to reduce the effect of outliers. There are more than 641 industry-year observations for the sample period 2000-2015.

Insert Table 1 here.

Table 1 panel B presents the summary data for the real and accrual earnings management measures. The mean (median) for ABEM and RAEM is 0.002 (0.015) and -0.045 (0.039), respectively. The mean (median) values for RAEM_PROD and RAEM_DISX are 0.001 (0.020) and 0.013 (-0.075), respectively. Table 1 panel C presents

the Pearson correlations among the variables, which are in the expected direction and magnitude.

Table 1

Real Activities Manipulation and Accrual-Based Earnings Management

Panel A: Estimation results of the Normal Levels of Production Costs, Discretionary Expenditures, and Accruals for years 2000-2015

	PROD/ A_{t-1}		**DISX/ A_{t-1}**		**Accruals/ A_{t-1}**
Intercept	-0.104***	Intercept	0.021	Intercept	-0.059***
$1/A_{t-1}$	0.359***	$1/A_{t-1}$	3.572***	$1/A_{t-1}$	-0.007
S_t/A_{t-1}	0.781***	S_{t-1}/A_{t-1}	0.190***	ΔSt/At_1	0.005
ΔSt/At-1	-0.022			PPE_t/A_{t-1}	-0.002
ΔSt-1/At-1	-0.003				
Adj. R-square	95.06%		83.59%		0.18%
N of observations	12,411		12,411		12,411
N of industry-years	641		716		685

Panel B: Summary statistics for real activities manipulation and accrual-based earnings management for years 2000-2015

Variable	**N**	**Mean**	**Median**	**Std. Dev.**	**25%**	**75%**	**Min**	**Max**
$ABEM_t$	7,673	0.002	0.0147	0.085	-0.025	0.044	-0.401	0.219
$RAEM_t$	7,140	-0.045	0.039	0.452	-0.297	0.281	-1.668	1.029
$RAEM\_PROD_t$	7,140	0.001	0.019	0.243	-0.129	0.149	-0.769	0.774
$RAEM\_DISX_t$	9,710	0.013	-0.075	0.244	-0.136	0.135	-0.493	1.009

Panel C: Pearson correlation table for years 2000-2015

	$ABEM_t$	**$RAEM_t$**	**$RAEM\_PROD_t$**	**$RAEM\_DISX_t$**
$ABEM_t$	1	0.058***	-0.080***	-0.207***
$RAEM_t$	0.058***	1	-0.201***	-0.990***
$RAEM\_PROD_t$	-0.080***	-0.201***	1	0.340***
$RAEM\_DISX_t$	-0.207***	-0.989***	0.341***	1

Notes: *, **, *** represent significance at the level of 10%, 5% and 1% levels, respectively.

4.2. Suspect Firms that Beat/Meet Earnings Benchmarks

Following Roychowdhury (2006), suspect firms are classified as firm-years where earnings before extraordinary items over lagged assets are between 0.0 and 0.005. Secondly, we measure suspect firms as beating/meeting last year earnings by zero to two cents. The third earnings benchmark used is the firm-years with actual earnings per share (EPS) less the last analyst forecast consensus before the fiscal year end between zero and one cent. To compare the suspect firms with non-suspect firms, the following regression is estimated (Roychowdhury, 2006):

$$Y_t = \beta_0 + \beta_0 logMVE_{t-1} + \beta_2 MtB_{t-1} + \beta_3 ROA_t + \beta_4 Suspect_t + \sum_j \beta_{5,j} YearIndicator_{t,j} + \varepsilon_t \quad \text{.....} \quad 7$$

The dependent variable (Y) captures the real activities manipulation (RAEM, RAEM_PROD, RAEM_DISX) and ABEM. I include the log of market value of equity (MVE_t), the market-to-book ratio (MtB_t), and the return on assets (ROA_t) to control for systematic variation in abnormal production costs, discretionary expenditures, and accruals. The variable $Suspect_t$ equals one if the firm just beats/meets one of the three earning benchmarks, and otherwise 0.

Table 2 presents the estimation results for the regression model (7). In Table 2 panel A the coefficient on $Suspect_t$ for both ABEM and RAEM is not significant,

suggesting that pilot firms are not likely to use either accrual-based or real activities earnings management methods to meet/beat zero earnings benchmarks. The coefficient on RAEM_PROD is positive and marginally significant. This indicates that pilot firms reduce discretionary production costs as one of the RAEM methods. The negative and significant coefficient for RAEM_DISX indicates that pilot firms are less likely to reduce discretionary expenditures in their earnings management.

Table 2

Suspect Firms Just Beating/Meeting Important Earnings Benchmarks for years 2000-2015

Panel A: Suspects are firm years just beating/meeting zero benchmark (n= 7,588)				
	$ABEM_t$	**$RAEM_t$**	**$RAEM\_PROD_t$**	**$RAEM\_DISX_t$**
Intercept	-0.003	0.141***	-0.047***	0.094***
MVE_{t-1}	-0.001	-0.011***	0.008***	-0.011***
MtB_{t-1}	0.001	0.000	-0.000**	0.001**
ROA_t	0.158***	-0.594***	-0.389***	-0.258***
$Suspect_t$	0.001	-0.024	0.042*	-0.088***
Year Indicators	Yes	Yes	Yes	Yes
Panel B: Suspects are firm-years just beating/meeting last-year earnings (n= 9,468)				
	$ABEM_t$	**$RAEM_t$**	**$RAEM\_PROD_t$**	**$RAEM\_DISX_t$**
Intercept	-0.003	0.139***	-0.046***	0.131***
MVE_{t-1}	0.000	0.011***	0.008***	-0.012***
MtB_{t-1}	0.000	0.000	-0.000**	0.001**
ROA_t	0.158***	0.594***	-0.389***	-0.251***
$Suspect_t$	0.008	0.012	-0.002	-0.145***
Year Indicators	Yes	Yes	Yes	Yes
Panel C: Suspects are firm years just beating/meeting analyst forecast consensus (n= 7,002)				
	$ABEM_t$	**$RAEM_t$**	**$RAEM\_PROD_t$**	**$RAEM\_DISX_t$**
Intercept	-0.003	0.140***	-0.045***	0.088***
MVE_{t-1}	-0.000	-0.011***	0.008***	-0.011***
MtB_{t-1}	0.000	0.000	-0.000**	0.001**
ROA_t	0.158***	-0.593***	-0.390***	-0.257***
$Suspect_t$	-0.005	0.053	-0.144***	0.165**
Year Indicators	Yes	Yes	Yes	Yes

Notes: *, **, *** represent significance at the level of 10%, 5% and 1% levels, respectively.

Table 2 panel B presents the estimation results for the Suspects firms that just beat/meet last-year earnings. The results for discretionary expenditures provide similar evidence as in panel A, indicating that suspect firms tend to reduce discretionary expenditures in their real activities earnings manipulation (RAEM_DISX (-0.145, $p<0.001$)).

Table 2 panel C presents the estimation results for the suspects just beating/meeting analyst consensus forecast. The coefficients on the Suspect variable for ABEM and RAEM are not significant. The coefficient on Suspect firms for RAEM_PROD is negative and significant and the coefficint for RAEM_DISX is positve and significant. These results suggest that pilot firms are inclined to use discretionary expenditures more than abnormal production costs when they engage in RAEM.

4.3. Heckman First-Stage Results

As mentioned earlier, we address the problem of the potential sample selection bias (Alam & Loh, 2004) by performing Heckman's procedure to adjust for the potential endogeneity problem. In the first step of Heckman procedure, we estimate the probit model in equation (4) to obtain the inverse Mills ratio (IMR) which is used in the second

stage as a control variable in equation (5) and (6). Table 3 (panel A and B) presents the summary data of the six independent variables used in the probit model. We compare suspect with non-suspect pilot firms (panel A) and suspect with non-suspect non-pilot firms (panel B). Compared to non-suspect pilot firms, suspect pilot firms are less prone to beat earnings, have smaller number of analysts following and smaller number of shares outstanding. In addition, suspect pilot firms have smaller market-to-book ratio and higher return on assets. Results presented in Table 3 panel B indicate that compared to non-suspect non-pilot firms, suspect non-pilot firms beat analyst forecast more often, are more likely to issue stock in the subsequent year, and have more analyst following. Higher market-to-book ratio and hold larger number of shares are observed in suspect non-pilot firms than non-suspect non-pilot firms.

Table 3

The First Step of the Heckman Procedure-the Model to Correct for Potential Sample Selection Bias, 2000 to 2015

Panel A: Summary Statistics			
	Suspect firm-years	**Non-Suspect firm-years**	**Difference**
	(n= 2,043)	(n= 7,460)	(Suspect-Non-Suspect)
	Mean	**Mean**	**Mean**
$Habitual\_Beater_t$	2.431	2.740	-0.309***
$Stock\_issuance_{t+1}$	0.889	0.889	-0.004
$Analyst\_following_t$	1.723	2.045	-0.322***
MtB_{t-1}	2.387	3.234	-0.848*
$Shares_t$	4.040	4.203	-0.163***
ROA_t	0.016	-0.064	0.080*
Panel B: Summary Statistics for Non-pilot firms			
	Suspect firm-years	**Non-Suspect firm-years**	**Difference**
	(n= 5349)	(n= 72314)	(Suspect-Non-Suspect)
	Mean	**Mean**	**Mean**
$Habitual\_Beater_t$	1.894	2.373	0.479***
$Stock\_issuance_{t+1}$	0.131	0.383	0.252***
$Analyst\_following_t$	1.436	1.716	0.2800***
MtB_{t-1}	1.546	4.116	2.570*
$Shares_t$	3.503	3.872	0.369***
ROA_t	0.005	0.005	0.001
Panel C: Estimation Results for the Probit model, Heckman (first stage)			
		Pilot firms	**Non-pilot firms**
		Coefficient	**Coefficient**
Intercept		-1.777***	-1.723***
$Habitual\_beater_t$		-0.068**	-0.073***
$Stock\_issuance_{t+1}$		-0.044	0.215***
$Analyst\_following_t$		-0.171***	-0.252***
MtB_{t-1}		-0.003	0.000
$Shares_t$		0.056*	0.048***
ROA_t		0.065	-0.043
Year Indicators		Yes	Yes
Pseudo R-square		4.4%	3.6%
n of observations		7,602	27,879

Notes: *, **, *** represent significance at the level of 10%, 5% and 1% levels, respectively.

Table 3 Panel C presents estimation results for the probit model that explains earnings management suspects for both pilot firms and non-pilot firms. In column A, the coefficients on Habitual_Beater and Analyst_following$_t$ are negative and highly significant. The results suggest that suspect pilot firms that beat analyst consensus forecast and have a high analyst following are less likely to engage in earnings management. The coefficient on Shares is positive and significant at ten percent level, indicating that suspect firms with large number of shares outstanding engage in more earnings management. When compared these results to non-pilot suspect firms we observe similar relationships with respect to earnings management (column B).

4.4. Heckman Second-Stage Results

Table 4 presents the results for estimating equation (5) and (6) with IMR from the first step of the Heckman procedure. The results capture trade-off between real activities manipulation and accruals-based earnings management. Table 4 panel A presents the results for both suspect pilot firms (columns 1 and 2) and suspect non-pilot firms (columns 3 and 4) for the entire period of 2000 to 2015. For the RAEM equation in column (1), the positive coefficient on Market_share (0.003, $p<0.001$) indicates that pilot firms use more real activities manipulation when they have higher level of market share. The negative coefficient on ZSCORE (-0.008, $p<0.001$) indicates that pilot firms with strong financial position are less likely to engage in real activities manipulation. However, institutional ownership (INST) and marginal tax rates (MTR) are found not to be significant cost considered when deciding on RAEM activity.

For the costs associated with the use of ABEM, only the coefficient on Cycle is negative and significant, indicating that firms with shorter operating cycles use RAEM more frequently. The results do not indicate that real activities manipulation increases with other ABEM cost determinants (Big8, Tenure, SOX and NOA) – the coefficients are insignificant. The results suggest that pilot firms are not sensitive to the costs related to ABEM when they engage in RAEM. The results support our hypothesis that for pilot firms, the decision of choosing between accrual-based earnings management and real activities manipulation does not depend on the relative costliness of each method.

The results presented in column (2) report the relationship between costs associated with both types of earnings manipulations and the use of ABEM for pilot firms. The coefficient on institutional ownership (*INST)* is negative and marginally significant, indicating that pressure from institutional investors restricts the use of ABEM. It is possible that institutional investors may not have sufficient scrutiny to reduce RAEM (as the coefficient is not significant for this variable in column (1)) but are able to enforce the limited use of ABEM on management. The results weakly support the findings by Park (2017) that short sellers engage in RAEM more when the firm has lower accounting flexibility or scrutiny from outside parties.

The positive and marginally significant coefficient on the SOX variable indicates that pilot firms do not limit the use of ABEM in the post-SOX period, despite high regulatory cost of compliance. The positive coefficient on Unexpected_RAEM (0.015, $p<0.01$) indicates that accrual-based earnings management is positively related to the unexpected amount of real earnings manipulation at the fiscal year-end. Thus, management of pilot firms does not make strong sequential and substitute decisions about the use of either RAEM or ABEM. The result does not support the findings by Park (2017) that short sellers understand the substitutive sophistication as external monitors of overall earnings quality and short sellers are highly informed about how managers trade off decisions on earnings management methods. Overall, the results

suggest that pilot firms were sensitive only to certain costs associated with ABEM when using RAEM, and vice versa. The results suggest that pilot firms are sensitive and selective with the costs of specific type of earnings management when deciding which method to choose. Management considers the costs of both types of earnings manipulations to the lesser extent than by Zang (2012). Overall, during the 2000-2015 period, firms use both earnings management method, RAEM and ABEM, without much preference. Thus, we find full support for the tested hypothesis.

Table 4

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

Panel A: Pilot vs. Non-pilot firms from 2000 to 2015				
	(1)	**(2)**	**(3)**	**(4)**
	RAEM Equation	**ABEM Equation**	**RAEM Equation**	**ABEM Equation**
	3,783	3,783	5,349	5,349
	Coefficient	**Coefficient**	**Coefficient**	**Coefficient**
Intercept	-0.052**	-0.011***	-0.094***	0.162***
	(-2.03)	(-2.58)	(-4.06)	(10.25)
Unexpected $RAEM_t$		0.015**		-0.044***
		(1.30)		(-3.10)
Costs associated with real activities manipulation				
$Market\_Share_{t-1}$	0.003***	0.004	-0.002	0.002***
	(3.17)	(2.44)	(-1.05)	(3.26)
$ZSCORE_{t-1}$	-0.008**	0.009	-0.002	0.007***
	(-2.39)	(1.13)	(-0.54)	(5.65)
$INST_{t-1}$	0.008	-0.003*	0.002	0.001
	(1.38)	(-1.95)	(0.76)	(0.34)
MTR_t	0.005	-0.003	0.052***	-0.099***
	(0.26)	(0.70)	(3.55)	(-10.67)
Costs associated with accrual-based earnings management				
$BIG8_t$	-0.005	0.004	-0.018***	0.038***
	(-0.79)	(0.27)	(-2.89)	(10.31)
$Tenure_t$	-0.001	-0.001	-0.002	0.002***
	(-1.33)	(-0.46)	(-1.43)	(5.66)
SOX_t	-0.003	0.003*	-0.017	-0.011*
	(-0.32)	(1.94)	(1.50)	(-1.86)
NOA_{t-1}	-0.009	0.002	-0.061***	0.103***
	(-1.28)	(1.05)	(-4.02)	(10.17)
$Cycle_{t-1}$	-0.002**	0.000	-0.000	0.000***
	(-2.08)	(-0.64)	(-0.81)	(2.65)
Control Variables				
ROA_t	-0.196**	0.083***	0.092**	-0.023
	(-2.38)	(3.93)	(2.18)	(-0.94)
$Assets_t$	0.009**	0.009*	0.012***	-0.017***
	(2.45)	(1.65)	(5.19)	(-8.86)
MtB_t	0.002	0.000	-0.002**	0.001
	(1.44)	(-0.70)	(-2.02)	(1.17)
$Earn_t$	0.000**		0.000***	
	(-2.02)		(-3.76)	
Predicted_ $RAEM_t$		-0.017		0.709***
		(-0.47)		(5.33)
IMR_t	-0.005***	0.004	-0.013**	0.035***
	(-2.58)	(0.69)	(-2.32)	(15.06)
Year indicators	Yes	Yes	Yes	Yes
F-statistic H_1	H_1	H_1	H_1	H_1
Adj. R-square	9.21	6.25	7.27	39.47

To be continued Table 4.

Panel B: Pilot vs. Non-pilot firms from 2005 to 2007 (Pilot Period)				
	RAEM Equation	**ABEM Equation**	**RAEM Equation**	**ABEM Equation**
	773	773	802	802
	Coefficient	**Coefficient**	**Coefficient**	**Coefficient**
$Intercept_t$	0.007	0.009	-0.183**	0.186***
	(0.11)	(0.90)	(-2.43)	(6.30)
Unexpected $RAEM_t$		-0.001		-0.032
		(-0.02)		(-1.11)
Costs associated with real activities manipulation				
$Market\_Share_{t-1}$	0.007**	0.001	-0.003	0.002*
	(2.57)	(1.52)	(-0.74)	(1.68)
$ZSCORE_{t-1}$	-0.015	0.004	-0.001	0.004***
	(-2.75)	(1.63)	(-0.07)	(3.65)
$INST_{t-1}$	0.004	-0.002	0.034	0.008
	(0.39)	(-0.84)	(1.25)	(0.67)
MTR_t	-0.012	-0.022	0.068	-0.126***
	(-0.33)	(-1.41)	(1.29)	(-7.29)
Costs associated with accrual-based earnings management				
$BIG8_t$	0.007	0.005*	-0.047*	0.031***
	(0.84)	(1.66)	(-1.95)	(3.43)
$Tenure_t$	-0.002	0.001	-0.011	0.019***
	(-0.86)	(0.29)	(-0.97)	(7.40)
NOA_{t-1}	-0.011	0.003	-0.081*	0.130***
	(-0.93)	(1.02)	(-1.94)	(8.93)
$Cycle_{t-1}$	-0.001***	-0.001	0.000	0.000
	(-2.66)	(-1.41)	(0.19)	(-0.62)
Control variables				
ROA_t	-0.113	0.033	0.089	0.662
	(-0.72)	(0.57)	(0.02)	(0.34)
$Assets_t$	0.002	-0.001	0.023**	-0.026***
	(0.25)	(-1.03)	(2.37)	(-6.64)
MtB_t	0.000	0.000	-0.006	0.008***
	(1.08)	(-1.49)	(-0.51)	(3.51)
$Earn_t$	0.000		0.000*	
	(-1.37)		(-1.96)	
Predicted_ $RAEM_t$		-0.003		0.692***
		(-0.06)		(5.69)
IMR_t	-0.009**	0.002	-0.025*	0.041***
	(-2.31)	(1.19)	(-1.97)	(7.84)
Year indicators	Yes	Yes	Yes	Yes
F-statistic H_1	H_1	H_1	H_1	H_1
Adj. R-square	20.66	9.06	11.51	51.00

Notes: columns (1) and (2) for pilot firms and columns (3) and (4) for non-pilot firms.

Results presented in column (3) report positive coefficient on MTR (0.052, $p<0.001$), indicating that non-pilot firms with higher level of tax burden are more prone to use real activities manipulation despite its high cost. In addition, the coefficient on Big8 (-0.018, $p<0.001$) indicates that non-pilot firms reduce the use of real activities earning management method to beat/meet earnings benchmarks when they are audited by one of the Big8 audit firm. However, the coefficients on Tenure and SOX are not significant, suggesting that non-pilot firms do not increase RAEM when audited by long term audit firm and in the post-SOX era. The coefficient on NOA (-0.061, $p<0.001$) suggests that firms with less accounting flexibility caused by accrual earnings management in the previous period, limit the use of RAEM and prefer the use of ABEM despite high cost of ABEM.

Results in Table 4 panel B column (4) show positive coefficients on Market_share (0.002, p<0.001) and ZSCORE (0.007, p<0.001), suggesting that non-pilot firms with stronger leadership status in their specific industries use ABEM to a greater extent than RAEM. The coefficient on MTR (-0.099, p<0.01) suggest that non-pilot firms with higher marginal tax rates prefer using RAEM over ABEM, possibly due to significant tax consequences. Considering the costs associated with ABEM activity, the results suggest that non-pilot firms audited by one of the Big 8 audit firms and with long term tenure use more earnings management through ABEM despite its high cost. The result for operating cycle (Cycle) suggests that firms which used ABEM in the prior period and have longer operating cycle are engaged in ABEM to a greater extent, thus there is no evidence that use of ABEM in the prior period restricts this activity in the current period. The results confirm that shorter life cycle constrains ABEM. In addition, results presented in Table 4 show that the coefficients on IMR in the RAEM and ABEM models are significant, which indicates that it is importance to correct for sample selection bias.

The coefficient on Unexpected_ RAEM in Table 4 panel A column (4) is negative (-0.044, p<0.001), which indicates that managers of non-pilot firms decide on the level of RAEM based on the observed cost factors before the fiscal year-end and adjust the level of ABEM after the fiscal year-end but before finalizing the accounting numbers for financial reporting purpose. Thus, for the entire period, non-pilot firms make sequential decisions about two types of earnings managers, consistent with Zang's (2012) finding and Park's (2017) findings.

Furthermore, we explore in greater details pilot period and the trade-off decisions during that specific time frame (2005-2007). Table 4 panel B column (1) reports that in estimating RAEM equation only two costs are significant to managers when evaluating decision to engage in RAEM. The positive coefficient on Market_share (0.007, p<0.01) shows that pilot firms use real activities manipulation more when the firms benefit higher market shares. The results further show that pilot firms do not fully consider the costs of ABEM when deciding on RAEM; the only significant coefficient is for Cycle (-0.001, p<0.001), indicating that firms with shorter operating cycles tend to use RAEM to a greater degree. In column (2) most of the coefficients are not significant, consistent with the evidence that pilot firms do not tradeoff between RAEM and ABEM, based on the relative costs of each method. The coefficient on Unexpected_RAEM is negative and insignificant suggesting that during the pilot period, pilot firms do not make sequential decisions about manipulating earnings through accruals or real activities.

Table 4 panel B column (3) presents evidence for non-pilot firms during the pilot period, showing that these firms did not fully consider the costs associated with ABEM when deciding on RAEM. Only two coefficients are marginally significant - Big8 and NOA. In column (4) for the ABEM equation, the positive and significant coefficients on Market_share (0.002, p<0.05) and ZSCORE (0.004, p<0.001) indicate that non-pilot firms with larger market shares and healthier financial condition tend to use ABEM more. The negative and significant coefficient on MTR (-0.126, p<0.001) indicates that firms engage less in ABEM when they face more costs of RAEM due to the greater current tax consequences. In terms of the costs associated with ABEM, coefficients on auditor-related variables (BIG8 and Tenure) are significant, suggesting that non-pilot firms still use ABEM more when audited by larger audit firms and with longer tenure. The positive coefficient on NOA (0.130, p<0.001) indicates that non-pilot firms still use accrual-based earnings management when they have a inflated balance sheet due to accrual manipulation in previous periods. Further, the coefficient on Unexpected_ RAEM is not significant and the coefficient on Predicted_RAEM (0.692, p<0.001) is positive and

highly significant. This implies that non-pilot firms manipulating both accruals and real activities during the pilot period do not fully modify the level of accrual-based earnings management after the fiscal year-end based on the realized level of real activities manipulation.

4.5. Additional Analysis

In additional analysis, we examine earnings management trade-off decisions during the sub-periods of 2000-2004 (pre-pilot period) and 2008-2015 (post-pilot) years. The untabulated results for pre-pilot period provide evidence that managers do consider relative costliness of ABEM when deciding on RAEM, although the observable costs related to regulatory and auditor scrutiny have little effects. The untabulated results combined with results from main analysis demonstrate that pilot firms are sensitive to certain costs associated with RAEM when they use ABEM during the pre-pilot period. We also provide marginal evidence that earnings management decisions are affected by the costs and timing of earnings management activities for nonpilot firms. We also examine earnings management trade-off decisions for pilot firms and non-pilot firms from 2008 to 2015 in the post-pilot period. The untabulated results show that pilot firms are concerned about the heightened scrutiny from auditors and audits performed by one of the Big8 audit firms constrain their use of RAEM in the post-pilot period and pilot firms' managers do not fully decide the level of RAEM based on the cost factors. For pilot firms, the results suggest that the audit firms are more prone to restrict firms' incentives to manage earnings with accrual accounts. During the post-pilot period, non-pilot firms' mangers make sequential and substitutive use of ABEM if the RAEM activities during the year are unexpectedly high.

V. CONCLUSION

Using a sample of firms selected in a pilot program of the SEC Regulation SHO, we examine whether managers make trade-off decisions between accrual-based earnings management and real activities manipulation and over the period 2000-2015. Prior studies provide evidence on the trade-off between ABEM and RAEM as costs of one type of earnings management increase, but no prior study has examined the substitution of accrual-based and real activities pilot firms during the SEC's pilot program. In this study we extend Fang et al. (2016), who finds evidence on the limited use of ABEM for pilot firms during the SEC's pilot program and increase back to the similar levels when the pilot program ends. Furthermore, these results complement findings in Zang (2012). We find that managers of pilot firms do not make strong sequential decisions about the application of both accrual-based earnings manipulation and real activities earnings management. Their choice does not completely depend on the relative costliness of earnings management strategies regardless of different periods. Thus, the decision to engage in a specific method of earnings management might be driven by other factors than costs.

The findings suggest that specifically pilot firms do not switch to real earnings manipulation when deciding on reducing the levels of accruals-based earnings manipulation. The findings imply that the disciplining effect of short selling extends to both types of earnings management, as a response to heightened short selling interest. Interestingly, the results indicate that market-based mechanisms (short selling) have different effect on trade-off decisions than regulatory-based mechanisms (SEC comment letters).

The findings of this paper should be of interest to the SEC regulators, as they should consider setting up new regulations/restrictions around short selling activities.

Furthermore, the results suggest that this sophisticated group of investors has an impact on management behavior with respect to earnings management and the results should be considered by other investors, including institutional investors when evaluating quality of financial statements. As short selling activity is considered by many as a threat to stock market volatility, it indicates desired positive benefit on management. Investors evaluating quality of financial statements should consider implications of this study. Additionally, our results will be useful to audit firms when evaluating the operational risk of companies with short selling interest. Since detecting real activities manipulations is not part of the standard procedures due to time and cost constraints, the results provide reassurance to audit firms in that area, with consideration of other factors affecting audit risk.

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