University of Alberta

Three Essays in Earnings Management to Sustain an Earnings String

by

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A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Accounting

Faculty of Business

DEDICATION

To my loving husband and son, Woong Choi and Junho Choi, who always have encouraged me to become an academic researcher. Also, to my supervisor, Professor Jennifer Kao, who has always been a great mentor in my research and life.

ABSTRACT

This thesis presents three essays on earnings management of firms with a string of consecutive earnings increases for at least five years (labelled an earnings string). In Chapter II, I examine the accrual management practice of firms with an earning string (labelled ES firms) along the string, and find that ES firms are more likely to increase discretionary accruals in the final two years of an earnings string and decrease discretionary accruals in the year when the string is broken. Further analysis shows that while accrual management starts during the middle part of an earnings string, it intensifies near the end. These findings imply that ES firms tend to use aggressive accrual management to sustain an earnings string when the string is toward the end. However, the discretionary accruals of such firms drop sharply at the break of an earnings string, presumably due to accrual reversal or a big bath strategy. I extend the findings in Chapter II to Chapter III by investigating the patterns of real activity management by ES firms along an earnings string. Results indicate that ES firms start to manage their real activities mid-way through the earnings string and significantly increase the intensity during the last two years of an earnings string. However, such firms do not undertake income-decreasing real activity management by raising discretionary expenses in the break year, perhaps out of concern that such action worsens the already poor financial situation that has halted the earnings string. In Chapter IV, I examine the market reaction to earnings management of ES firms, especially focusing on whether the market response is different when ES firms engage in

accrual management from when they use real activity management. I find that capital market significantly reduces its rewards to ES firms when accrual management of these firms is high compared to when it is low. On the other hand, the market response to real activity management of ES firms is insignificant or mixed, suggesting that it is more difficult for investors to identify real activity management of ES firms compared to accrual management of such firms.

ACKNOWLEDGEMENT

I would like to express my sincere thanks to all people who have supported me throughout my time in Edmonton at the University of Alberta.

First, I am grateful to my supervisor, Professor Jennifer Kao, for her guidance, encouragement, and support with endless patience over five years during my doctoral program. She has been a great mentor and supporter in my life, and has shown me the way to become an outstanding researcher. I also thank the other committee members: Yonghua Ji (Chair), Yao Tian, Tom Schneider, Christoph Frei, and Bin Ke (Nanyang Technological University), for their great support and insightful suggestions for my thesis. Special thanks to the staff at the Business School, University of Alberta for their helpful assistance and support during my doctoral program.

I also express my gratitude to my family, Woong Choi and Junho Choi. Without their continual support, I would not have been able to successfully complete my doctoral study. Especially, I owe my lovely son, Junho Choi, magnificent contributions to my research and life during the doctoral program. I want to thank my parents and other family members for their support and love.

Finally, I would like to thank all my friends, fellow doctoral students, and people who have worked with me and have helped my research.

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CHAPTER 1

INTRODUCTION

Virginia M. Rometty, the president and CEO of IBM, celebrated the company's performance in 2011 annual report, stating that "We have continued to achieve strong EPS growth…This marked nine straight years of double-digit EPS growth." As implied by this remark, achieving a consistent earnings growth is an important goal for businesses. In the capital market, firms with a pattern of earnings growth tend to outperform their competitors, and suffer from negative market reaction when the earnings momentum (labelled an earnings string in the thesis) ends. Although an earnings string is often perceived as a good indicator of a firm's strong performance, some firms may have incentives to manage earnings to maintain an earnings string - especially when their actual performance is declining. This idea motivates me to pursue the following research questions in this thesis: Do firms with an earnings string engage in earnings management to sustain the string (Chapters 2 and 3)? How does the market respond to earnings management activities undertaken by such firms (Chapter 4)?

Consistent with the anecdotal evidence, previous accounting studies have shown that firms reporting a string of consecutive earnings increases (labelled ES firms in the thesis) are rewarded for the earnings string, but are penalized when the string is broken (Barth, Elliott and Finn 1999). Myers, Myers and Skinner (2007) point out that earnings management may have played a role in achieving an earnings string. Ke, Huddart and Petroni (2003) provide evidence that firm managers can predict the break of an earnings momentum and utilize this information when trading their shares. Chapter 2 extends this line of research to examine the patterns of accrual management (proxied by performance-matched, performance-adjusted and performance-unadjusted discretionary accruals) undertaken by ES firms along an earnings string. Specifically, I compare the level of accrual management in both the two years before the break and the break year with that during the remaining years within an earnings string. Main findings are that ES firms significantly increase discretionary accruals near the end of an earnings string and the converse is true when the string ends. Partitioning the earnings string into four sub-periods, I find that discretionary accruals of ES firms increase gradually from the first two years to the middle part of an earnings string, and then rise sharply in the two years immediately preceding the break before reaching the peak in the last year of an earnings string. These results imply that ES firms are more likely to engage in aggressive accrual management to maintain an earnings string near the end of the string. The sharp decline in discretionary accruals in the break year suggests possible accrual reversal or a big bath strategy to reserve accounting reserve for the future.

Chapter 3 addresses similar research questions to see if ES firms use an alternative earnings management technique commonly cited in the literature, real activity management, to sustain an earnings string. Results indicate that the level of real activity management (proxied by performance-matched, performance-adjusted and performance-unadjusted abnormal discretionary expenses multiplied by −1) also peaks in one or two years prior to the break year. However, unlike accrual management, I do not find a significant reversal in the level of real activity management in the break year, perhaps to prevent further decline in earnings and short-term performance. To the best of my knowledge, the extant literature has not considered the possibility of using real activity management to sustain earnings momentum.

Chapter 4 extends prior research on market reaction to firms with an earnings string (Barth et al. 1999) to study the questions of how the market responds to accrual and real activity management undertaken by ES firms and if the market's reaction to these two types of earnings management differs. I find that the market awards significantly lower market premium (proxied by stock price level, change in stock price and market-adjusted return) to ES firms that engage in a high level of accrual management, compared to those with a low level of accrual management. On the other hand, there is no clear evidence that the capital market can differentiate and price correctly the real activity management by ES firms.

The thesis contributes to the debate about whether accrual management and real activity management are complements or substitutes. Findings that ES firms use both earnings management tools near the end of an earnings string to sustain the string suggest that they are complements. On the other hand, evidence that only accrual management significantly declines in the year when an earnings string is broken implies that these two earnings management tools may be substitutes. The differential ability by the market to detect and reward ES firms that engage in accrual vs. real activity management further suggests that ES firms may potentially use these two techniques strategically, a prospect which may hurt firm performance in the long run.

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CHAPTER 2

Accrual Management as a Means to Sustain Consecutive Earnings Increases

2.1 INTRODUCTION

Many firms view attaining a string of consecutive earnings increases as an important goal because the capital market rewards consistent earnings growth and reacts negatively to the break to this pattern (Myers, Myers and Skinner 2007; Barth, Elliott and Finn 1999). Sustaining earnings growth is also important to firm managers who are remunerated based on performance (Ke 2004). While firms with competitive advantages in the product market can outperform their competitors (Porter 1985), maintaining a pattern of earnings increases is difficult due to the cyclical nature of underlying economic conditions. Thus, firm managers are often motivated to take actions to ensure the continuity of an earnings string for as long as possible. One method whereby growth in earnings can be artificially sustained is through earnings management. Myers et al. (2007) interpret a larger than expected number of firms with earnings strings as *prima facie* evidence of earnings management. Crucial to this argument is the assumption that insiders have superior information about earnings, compared to outside investors. Information asymmetry allows insiders to predict or time the break to an earnings string by selling their shares three to nine quarters in advance of actual earnings reports announcing the reversal to the upward earnings trend (Ke, Huddart and Petroni 2003), even though institutional investors normally do not start trading until one or two quarters before the break (Ke, Petroni and Yu 2008; Ke and Petroni 2004). A break to an earnings string may eventually occur however, if the pre-managed earnings are too low compared to the last period's earnings. Firms may also find it useful to take a "big-bath" in some years in order to create accounting reserve for future periods and hence enhance the chance of starting another earnings string soon after the break.

The purpose of Chapter 2 is to provide empirical evidence on accrual management (labelled AM hereinafter) as a means to sustain earnings growth. Specifically, I address the following two research questions: First, do firms with earnings strings (i.e., ES firms) undertake more aggressive accrual management near the end of an earnings string, compared to the rest of an earnings string? Second, is the break year [1] characterized by a different pattern of accrual management from that within an earnings string? The sample spans a 19-year period (1989–2007) and consists of 889 earnings strings from 845 firms. [2] Following Barth et al. (1999), I define each earnings string as including at least five-year consecutive increases in earnings per share. The majority of sample firms (801 firms) have exactly one earnings string during the sample period and the remaining 44 firms have two earnings strings each. In the main analysis, I use

[1] The break year is defined as the year immediately following the end of an earnings string.
[2] They correspond to 6,385 firm-year observations, including the break year.

performance-matched discretionary accruals (labelled $DACC^{PM}$ hereinafter) estimated from the forward-looking modified-Jones model as a proxy for earnings management and regress $DACC^{PM}$ on two test variables *Break* and *LateES*, representing the break year and the late-ES period (i.e., final two years of an earnings string), respectively. The regression also controls for a set of well-known determinants of discretionary accruals.

Results indicate that the actual number of earnings strings whose peak level of discretionary accruals occurs in the late-ES period (early-ES period) is higher (lower) than expected. On average, the late-ES period has a significantly larger $DACC^{PM}$ than the early-ES period, whereas the break year's $DACC^{PM}$ is significantly smaller than that from the early- as well as the late-ES period, implying the possibility of accrual reversals.[3] Controlling for the potential effects of covariates, I find that the coefficient estimate on the *LateES* variable is positive and significant and that on the *Break* variable is negative and significant. Consistent with the insider trading behaviour documented by Ke et al. (2003), the extent of accrual management intensifies towards the end of an earnings string. All the results continue to hold when I restrict the sample to 801 ES firms that have only a single earnings string or 433 ES firms whose earnings strings last exactly five years. Using two alternative proxies for earnings management, i.e., performance-adjusted and performance-unadjusted discretionary accruals

[3] However, the pattern involving the break year can also suggest that firms opt for a big-bath strategy in order to build up accounting reserve for future use.

(labelled $DACC^{PA}$ and *DACC* hereinafter), also does not change any of the results qualitatively speaking.

To gain further insight into the progression of accrual management within an earnings string, I modify the research design to allow each year within the late-ES period to enter the model separately. Regardless of the choice of proxies for earnings management ($DACC^{PM}$, $DACC^{PA}$ or *DACC*), the coefficient estimate is larger with more significant *t*-statistics in the year immediately preceding the break, compared to two years before the break. Since the length of the early-ES period ranges from three to 16 years in the sample, I next reclassify it into the two sub-periods, representing the first two years (the reference group) and the middle years of an earnings string (labelled *MidES* hereinafter). Results indicate that the coefficient estimate on *MidES* is positive and significant. More importantly, for various combinations of sample definitions and accrual proxies, the coefficient estimates on *MidES* are consistently smaller and *t*-statistics weaker than the corresponding figures on *LateES*. Taken together, evidence suggests that while accrual management starts before the late-ES period, it intensifies as firms move towards the end of an earnings string. By comparison, the coefficient estimate on the *Break* variable is negative and significant, depicting a different pattern of accrual management from that in pre-break years.

Chapter 2 extends the earnings string literature, looking into the incentives for achieving an earnings string, to study accrual management as a means to sustain earnings strings. To the best of my knowledge, only a recent study by Yong (2009) also addresses similar research questions and, like Chapter 2, he concludes that ES firms use large discretionary accruals in the last two years of their earnings strings.[4] However, there are several major differences that set Chapter 2 apart from Yong (2009): First, I examine ES firms' accrual management practice throughout the entire earnings string as well as during the break year. This allows me to analyze changes to such practice over time. In contrast, Yong (2009) focuses on accrual management in the final three years of an earnings string for firms reporting at least three consecutive years' of earnings growth. Thus, he cannot speak to the question of whether accrual management in the latter part of an earnings string is different from that in the early part and if there is any change to the pattern of accrual management when an earnings string finally ends. Second, I partition the earnings string into two sub-periods in the main analysis, or three to four sub-periods in the further analysis, and do not permit the final year of the sample period (2007) to be part of an earnings string. Thus, both the break year and the late-ES period are clearly defined regardless of the length of earnings strings. By comparison, the final year of Yong's sample period (2005) can be part of an earnings string.[5] Third, I use the income statement approach to calculate total accruals, whereas Yong (2009) uses the balance sheet

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[4] Another concurrent study by Baik, Farber, Johnson and Yi (2008) examines the role of accounting fundamentals and earnings management within an earnings string, and finds that discretionary accruals increase significantly in four quarters right before the break, during which growth in fundamentals starts to decline. A direct comparison of my findings with Baik et al. (2008) is difficult however, as they use quarterly data and their research question requires a different research design. Moreover, the authors point out that relying on quarterly data in their setting may pose some problems because many accounting fundamentals, suppressed from their model, cannot be measured using quarterly data (e.g., effective tax rates, the number of employees, auditor quality and corporate governance).

[5] For example, earnings strings that include 2005 may have ended in 2005 or continued beyond 2005. It is therefore difficult to determine when accrual management started within the earnings string.

approach. The former method is conceptually superior (Hribar and Collins 2002), but is not feasible in Yong (2009) as his sample period starts in 1952, well before cash flow statement became mandatory in 1988.

The remainder of Chapter 2 is organized as follows. Section 2.2 presents a review of related literature and the development of hypotheses. Sections 2.3 and 2.4 summarize data and research design, respectively. Section 2.5 reports results from the main analysis and the sensitivity analysis, followed by further analysis in Section 2.6. Section 2.7 concludes this chapter.

2.2 LITERATURE REVIEW

Burgstahler and Dichev (1997) provide evidence that small positive earnings changes occur more frequently than small negative changes and that firms with a long history of increasing earnings tend to report small earnings growth. Consistent with these findings, Myers et al. (2007) find that the number of firms with strings of non-decreasing earnings for at least 20 quarters is much larger than expected based on simulation, implying the likely presence of earnings management to avoid earnings decreases. The incentive to manage earnings may be especially strong among firms with consistent earnings growth. This is because capital market rewards firms exhibiting a pattern of increasing earnings with high price-earnings multiples (Barth et al. 1999) and penalizes ES firms when the string is broken (Lev, Ryan and Wu 2008).

Extending this line of enquiry to study the trading behaviour in quarters preceding the break to an earnings string, Ke et al. (2003) find that insiders[6] sell their shares about three to nine quarters before the break.[7] In contrast, institutional investors do not undertake abnormal selling until one quarter before the break (Ke et al. 2004).[8] The asymmetric trading patterns may be attributable to insiders' information advantage over institutional investors. Alternatively, they may also suggest that insiders have the ability to control the timing of break by managing earnings, which sustains the appearance of growth until it is no longer viable. One of the means for earnings management is through the provision of discretionary accruals. Prolonged earnings management, however, may lead to restatements when an earnings string is finally broken. Richardson, Tuna and Wu (2002) show that restatement firms tend to have longer strings of consecutive earnings growth than non-restatement firms. Lev et al. (2008) also find that the market reacts more negatively to restatement firms whose earnings restatements eliminate or shorten the pattern of earnings strings than to other restatement firms.

Yong (2009) and Baik et al. (2008), reviewed in Section 2.1, provide evidence of accrual management by firms with a string of earnings increases. If continuous earning growth is indeed sustained by aggressive accrual management,

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[6] When calculating insiders' buying activities, Ke et al. (2003) do not consider grants and option exercise. This is because insiders cannot completely control both the quantity and the timing of grants, and they are more likely to sell their acquired stock from option exercise immediately after exercising the option, resulting in no net trade.

[7] Ke at al. (2003) argue that insiders do not sell their stocks shortly before the break to avoid being sued under the SEC Act of 1934 Section 10(b), Insider Trading Sanctions Act (1984) or the Insider Trading and Securities Fraud Enforcement Act (1988).

[8] However, such advantage seems to disappear after the release of Regulation Fair Disclosure (see Ke et al. 2008).

then firms are more likely to manage earnings upwards when an earnings string is near the end. In doing so, insiders can postpone the bad news about upcoming break to the earnings string and sell their shares at high price until firms recover from unfavourable underlying economic downturn. However, the capital market may be able to detect attempts by firms to sustain an earnings string through aggressive accrual management and reward a greatly reduced market premium to these firms.[9] To the extent that some of market participants (e.g., smaller individual investors) cannot completely see through accrual management, the incentive by ES firms to manage earnings and prolong earnings string may still remain. The above discussion leads to the first hypothesis for Chapter 2 (stated in the alternate form):

> **HYPOTHESIS 2A**. *Ceteris paribus*, ES firms are expected to report more aggressive income-increasing discretionary accruals near the end of an earnings string, compared to the early part of an earnings string.

Earnings strings normally do not last for an indefinite period of time due to the unpredictability of macroeconomic and/or firm-specific circumstances. Even if growth is artificially sustained through accrual management, an earnings string may eventually break when earnings are too low to achieve earnings increases with the help of aggressive accrual management. In this case, firms may revert

[9] I will take a closer look at market response to earnings management by ES firms during an earnings string in Chapter 4.

back to "normal" reporting without attempting to manage earnings in either direction. Since accruals are reversed in the following period (DeFond and Park 2001), aggressive accruals near the end of earnings string are expected to be reversed and yield lower discretionary accruals during the break year.

In addition to the accrual reversal, firms may also opt for overly conservative accounting choices and take a "big-bath" in the break year, making their performance appear even worse. Empirical evidence supporting the presence of a big-bath strategy is documented in Healy (1985), who shows that managers choose income-decreasing discretionary accruals to maximize future period's bonus when the pre-managed earnings are either above the upper bound or below the lower bound set out in a bonus plan. More recently, Abarbanell and Lehavy (2003) suggest that firms have an incentive to manage earnings downward in order to increase accounting reserve for future period when the sum of pre-managed earnings and available reserve are below target earnings issued by financial analysts (known as "earnings bath" strategy). Finally, Kirschenheiter and Melumad (2002) demonstrate analytically that when earnings news is sufficiently bad, the manager would report the lowest earnings amount possible, as it enhances the chance of achieving better earnings performance in the following period.

Either accrual reversal or a big-bath strategy is expected to result in significantly different reporting behaviour during the year when an earnings string is finally broken, compared to years leading to the break.[10] This is summarized in the final hypothesis for Chapter 2 (stated in the alternate form):

> **HYPOTHESIS 2B**. *Ceteris paribus*, ES firms are expected to report less income-increasing discretionary accruals during the break year, compared to years within an earnings string.

2.3 DATA AND SAMPLE

The initial sample consists of 77,499 firm-year observations in the non-financial and non-regulated industries collected from COMPUSTAT Fundamental Annual database between 1989 and 2007.[11] The sample period begins in 1989 and ends in 2007 because firms must have one- to two-year lag data as well as one-year lead data to calculate discretionary accruals and several control variables. Moreover, the starting point of 1989 allows me to calculate total accruals using the income statement approach, which became mandatory in 1988 and is considered conceptually superior to the balance sheet approach (Hribar and Collins 2002).

Following the convention of Barth et al. (1999), I define ES firms as those with at least five-year consecutive increases in earnings per share (EPS).[12] For the

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[10] It is beyond the scope of current study to distinguish between these two competing arguments.
[11] The Financial and Regulated industries include SIC 6000–6999 and SIC 4400–5000, respectively.
[12] According to that study, the probability of reporting earnings increases in year *t* by firms with at least five-year (one to four year) consecutive earnings increases in year $t-1$ is greater (less) than the unconditional probability of reporting earnings increases in year *t*. Thus, consistent earnings increases for up to four years may be less informative about the eventual length of earnings string, compared to a history of increasing earnings for at least five years (see Footnote 12, Page 396,

1,347 earnings strings (equivalently 8,369 firm-year observations) that fit this definition, I further impose the requirements that earnings strings do not contain the year 2007 and that accounting data be available in the break year because my analysis requires a clear identification of the break year. Eliminating 458 strings (or 2,873 firm-year observations) that do not meet these two requirements yields a total of 889 earnings strings (or 5,496 firm-year observations). Combining these observations with another 889 that represent the break year leads to the final sample of 6,385 firm-year observations (labelled ES sample hereinafter). Panel A of Table 2.1 summarizes the above sample filter rules.

As is evident in Panel B of Table 2.1, the ES sample consists of 889 earnings strings from 845 distinct firms. Most of the earnings strings represent the first earnings string for a particular firm and only a few are the second string (i.e., 845 vs. 44). It would appear that firms rarely succeed in putting together another earnings string following a break to the first string. In total, 801 distinct firms have only one earnings string during the entire sample period and 44 firms have two strings. The ES sample is distributed over 37 two-digit SIC industries, where one firm (or six firm-year observations) comes from the Mining & Construction industries and 146 firms (or 1,131 firm-year observations) are drawn from the Retail industry (see Panel C). This pattern of industry distribution is largely comparable to that for the overall COMPUSTAT population. Panel D presents the frequency distribution by the length of earnings strings. Almost half (49.95

Barth et al. 1999). The split-adjusted annual EPS (excluding extraordinary items) is used as a proxy for reported annual earnings.

percent) of the ES sample has strings that last exactly five years, and most of the 889 earnings strings (96.76 percent) last 10 years or less.

[Insert Table 2.1 about Here]

2.4 RESEARCH DESIGN

To test the prediction of Hypothesis 2A and Hypothesis 2B, I estimate the following regression model by pooling across the 845 ES firms (equivalently 6,385 firm-year observations):[13]

$$\begin{aligned} Y_{it} = {} & \beta_0 + \beta_1 \bullet LateES_{it} + \beta_2 \bullet Break_{it} \\ & + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} \\ & + \gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it} + \gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it} \\ & + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it} \end{aligned} \tag{2-1}$$

where subscripts i, t and j represent sample firm i in year t and industry j. Definitions and measurements for all the variables in Equation (2-1) (discussed below), along with those in subsequent equations are summarized in Appendix 2-I.

[Insert Appendix 2-I about Here]

<u>Dependent Variable</u>

The dependent variable in Equation (2-1), Y_{it}, proxies for the extent of earnings management and in the main analysis it is given by performance-matched discretionary accruals (i.e., $DACC^{PM}_{it}$), calculated using the following two-step

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[13] All continuous control variables in Equation (2-1) are winsorized at the top and bottom 1 percent to mitigate the effects of outliers. In reporting *t*-values, I use robust standard errors to correct for potential problems associated with heteroskedasticity and firm clustering (Petersen 2009). The main results are similar when I use the two-way clustered (firm and year) standard errors.

procedure: First, I estimate discretionary accruals based on the forward-looking modified-Jones model (Dechow, Richardson and Tuna 2003), described below:[14]

$$\frac{TAC_{it}}{TA_{it-1}} = \alpha_1 \frac{1}{TA_{it-1}} + \alpha_2 \frac{(1+k)\Delta S_{it} - \Delta REC_{it}}{TA_{it-1}} + \alpha_3 \frac{PPE_{it}}{TA_{it-1}} + \alpha_4 \frac{TAC_{it-1}}{TA_{it-2}} + \alpha_5 \frac{\Delta S_{it+1}}{S_{it}} + \varepsilon_{i.t} \quad (2\text{-}2)$$

where TAC_{it} is total accruals, defined as income before extraordinary items minus cash flows from operating activities; TA_{it-1} denotes total assets; ΔS_{it} is changes in sales; ΔREC_{it} is changes in account receivables from trade; k is the estimated slope coefficient from regressing $\Delta REC_{it}/TA_{it-1}$ on $\Delta S_{it}/TA_{it-1}$ for each two-digit SIC industry-year grouping and is restricted to between zero and one; PPE_{it} denotes gross property, plant and equipment. The residuals from Equation (2-2), estimated cross-sectionally by two-digit SIC industry every year, represent discretionary accruals for sample firm *i* in year *t* (i.e., $DACC_{it}$). Appendix 2-II summarizes the mean values of estimated coefficients across all industry-years, along with the *t*-statistics calculated using the mean value of standard errors across industry-years and the mean value of adjusted R-square.[15]

[Insert Appendix 2-II about Here]

Second, I match every ES firm with a non-ES firm that has the closest return on assets (*ROA*)[16] within the same industry-year group. In the event of ties on *ROA* among multiple non-ES firms, the firm with the closest firm size (expressed as natural logarithm of market value of equity) is selected as the match.

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[14] The estimation is on 77,499 firm-year observations over a 19-year (1989–2007) sample period. All variables in Equation (2-2) are winsorized at the top and bottom 1 percent of their respective distributions.

[15] Estimated coefficients have the same signs as those in Dechow et al. (2003) and are significant at the conventional levels.

[16] *ROA* (return on assets) is defined as net income deflated by opening total assets.

The performance-matched discretionary accruals for ES firm *i* are its discretionary accruals minus the matched non-ES firm's discretionary accruals. I work with performance-matched discretionary accruals to mitigate potential measurement errors, as the ES sample has significantly stronger performance than the non-ES firms (Kothari, Leone and Wasley 2005).

In the sensitivity analysis (Section 2.5.4), I consider the following two alternative measures of discretionary accruals estimated from the same forward-looking modified-Jones model (i.e., Equation (2-2)) as the dependent variable in each regression: the performance-adjusted discretionary accruals (i.e., $DACC^{PA}{}_{it}$), which are defined as the difference between an ES sample firm's discretionary accruals and the median discretionary accruals for each *ROA* decile within the same industry-year group (Cahan and Zhang 2006), and discretionary accruals unadjusted for firm performance ($DACC_{it}$).

Test Variables

Equation (2-1) includes two test variables: $LateES_{it}$, set equal to one if an observation falls in the late-ES period (i.e., final two years of an earnings string) and zero otherwise;[17] and $Break_{it}$, set equal to one if an observation falls in the break year and zero otherwise. The remaining years of an earnings string, i.e., the early-ES period, serve as the reference group. The length of early-ES period ranges from three years for a five-year earnings string to 16 years for an 18-year earnings string. Since the test variables are indicator variables, the coefficient estimate on $LateES_{it}$ or $Break_{it}$ represents the difference from the reference group.

[17] As further analysis, I also consider alternative definitions of $LateES_{it}$ in Section 2.6.

My decision to combine observations from the last two years of an earnings string into one test variable $LateES_{it}$ is motivated by Ke et al. (2003) who report that the intensity of insider trading activities increases in three to nine quarters before the break quarter, suggesting that earnings management may have intensified during this time period. This approach is also consistent with the pattern of mean and median values of discretionary accruals ($DACC^{PM}_{it}$, $DACC^{PA}_{it}$ and $DACC_{it}$) by year within an earnings string, depicted in Figures 2.1A and 2.1B. Since only 64 firm-year observations, or less than 1 percent of total sample, come from 10 to 18 years before the break, I combine these observations into one sub-period, labelled −10up, to ease the presentation. The mean values exhibit a gradual increasing trend, with a major drop eight years before the break for $DACC^{PM}_{it}$ and $DACC^{PA}_{it}$ and five years before the break for $DACC_{it}$.[18] For all three discretionary accrual measures, the mean values are consistently negative or close to zero until three years before the break[19] and peak in the year immediately preceding the break, followed by a sharp decline during the break year. On the other hand, changes in EPS increase gradually with dual peaks occurring five years and one year before the break,[20] but decrease sharply at the break, suggesting that the final year of an earnings string may have been maintained through aggressive accrual management (see Figure 2.1A). The corresponding

[18] A much smaller drop is also evident three years before the break for $DACC^{PM}_{it}$ and $DACC^{PA}_{it}$, and eight years before the break for $DACC_{it}$.

[19] For example, the mean value of performance-matched discretionary accruals turns positive in −1Break. It would appear that the ES firms generally have stronger fundamentals than the non-ES firms, matched on performance.

[20] Changes in EPS are winsorized to −1.5 and +1.5 (see Barth, Hodder and Stubben 2008; Kothari, Laguerre and Leone 2002; Easton and Harris 1991).

patterns based on median values in Figure 2.1B are similar, except that the median values of $DACC^{PM}_{it}$ and $DACC^{PA}_{it}$ have a small peak three years before the break, followed by a major peak the year before the break, while the median values of changes in EPS peak in the year immediately preceding the break.

[Insert Figures 2.1A and 2.1B about Here]

Control Variables

Equation (2-1) also includes eight control variables found to affect a firm's incentives for earnings management through accruals in the prior literature.[21] They are firm size ($Size_{it-1}$), measured as log transformation of opening market value of equity; book-to-market ratio (BTM_{it-1}), defined as book value over market value of equity at the beginning of the year; debt-to-asset ratio ($Leverage_{it-1}$); cash flows from operations scaled by opening total assets (CFO_{it}); prior year loss ($Loss_{it-1}$), taking on a value of one if the firm reports a net loss in the previous year and zero otherwise; new equity issues ($NewIssue_{it}$), set equal to one if a firm raises capital in the current period and zero otherwise; litigation risks ($Litigation_{it}$), taking on a value of one if the firm belongs to the following high-risk industries: Biotechnology (SIC 2833–2836 and SIC 8731–8734), Computer (SIC 3570–3577 and 7370–7374), Electronics (SIC 3600–3674) and Retailing (SIC 5200–5961); and audit quality ($BigN_{it}$), set equal to one if the firm retains a Big-N auditor and zero otherwise. Finally, since the sample spans over 19 years and covers a large

[21] Each of the control variables is considered in at least one of the following studies: Cohen and Zarowin (2010); Ball and Shivakumar (2008); Lim and Tang (2008); Zang (2007); Barton and Simko (2002); Francis, Maydew and Sparks (1999); Healy and Wahlen (1999); Erickson and Wang (1999); Teoh, Welch and Wong (1998); Dechow, Sloan and Sweeny (1996); Dechow, Sloan and Sweeny (1995); Dechow (1994); Francis, Philbrick and Schipper (1994).

number of two-digit SIC industry groups, I also include *IndustryDummy* and *YearDummy* variables to control for the potential industry and year effects. To ease exposition, subscripts *i* and *t* are suppressed in the subsequent discussion.

Model Predictions

A positive and significant coefficient estimate on the test variable *LateES* is consistent with the prediction that ES firms report more aggressive income-increasing discretionary accruals near the end of an earnings string, compared to the early part of an earnings string (Hypothesis 2A). On the other hand, a negative and significant coefficient estimate on the test variable *Break* implies that ES firms report less aggressive income-increasing discretionary accruals during the break year than during the early part of an earnings string (Hypothesis 2B). Finally, a reversal in sign on the *Break* variable from that on *LateES* suggests a different pattern of accrual management in the break year, compared to that in the latter part of an earnings string (Hypothesis 2B).

2.5 MAIN ANALYSIS

2.5.1 Descriptive Statistics

Table 2.2 presents the distribution of model variables in Equation (2-1) for the 845 ES firms (or 6,385 firm-year observations). All three discretionary accrual measures range between –1 and +1 (see Rows 1–3). While the performance-matched and performance-adjusted discretionary accruals have negative mean and median values (–0.0113 and –0.0037; –0.0097 and –0.0067), the performance-unadjusted discretionary accruals have positive mean and median values (0.0012; 0.0013). These descriptive statistics suggest that ES firms generally have lower discretionary accruals than their matched firms or the median firm in their industry. In general, ES sample firms have positive cash flows (mean *CFO* = 0.1112), larger market value than book value (mean *BTM* = 0.4611), and far less debts than assets (mean *Leverage* = 0.1863). Only a few ES firms reported loss in the previous year (*Loss* = 0.1634), and less than 40 percent belong to highly litigious industries (*Litigation* = 0.3677). The vast majority of ES firms issue equity capital in the current period (*NewIssue* = 0.8293) and retain a Big-N auditor (*BigN* = 0.8678).

[Insert Table 2.2 about Here]

Table 2.3 presents the correlation matrix among the three discretionary accrual measures and control variables (other than *Industry* and *Year* dummies) in Equation (2-1) for the 845 ES firms (or 6,385 firm-year observations). The pair-wise Pearson (Spearman rank) correlations appear above (below) the diagonal. The three discretionary accrual measures are highly correlated with each other at the 1 percent level. The Pearson correlation coefficients between $DACC^{PM}$ and $DACC^{PA}$, $DACC^{PM}$ and $DACC$ and $DACC^{PA}$ and $DACC$, are 0.6474, 0.5713 and 0.8675, respectively. All three measures are negatively and significantly correlated with *Size* and *CFO* at the 1 percent level. The Pearson correlation coefficients between *Size* (*CFO*) and $DACC^{PM}$, $DACC^{PA}$ and $DACC$ are –0.1107, –0.1497 and –0.0515 (–0.3765, –0.4712 and –0.2285), respectively, suggesting that large and cash-rich firms tend to report significantly smaller discretionary accruals. However, some variations in the pair-wise correlations between measures of discretionary accruals and other control variables are noted. These patterns extend to Spearman rank correlations. Un-tabulated results indicate that the largest variance inflation factor and the largest condition index are 1.5681 and 2.2284, respectively. Thus, multicollinearity is unlikely to be a major concern.

[Insert Table 2.3 about Here]

2.5.2 Results from Univariate Analysis

Panel A of Table 2.4 presents the expected and observed numbers of earnings strings whose peak level of discretionary accrual occurs in each of the following three sub-periods: early-ES period, late-ES period and the break year. The expected numbers of earnings strings that peak in these three sub-periods are 518, 247 and 124, respectively (see Column 3)[22] and the corresponding actual numbers are 498, 287 and 104, respectively (see Column 4). A *Chi-square* test of difference between the expected and the observed frequency distributions rejects the null of no difference at the 1 percent level.

Rows 1–3 of Panel B, Table 2.4 report the mean and median values of performance-matched discretionary accruals ($DACC^{PM}$) calculated over 3,718, 1,778 and 889 firm-year observations for the early-ES period, the late-ES period and the break year, respectively. The mean (median) values of $DACC^{PM}$ for these three sub-periods are –0.0126, –0.0015 and –0.0260 (–0.0130, –0.0003 and –0.0173), respectively. As is evident in Row 4, the mean $DACC^{PM}$ from the late-ES

[22] They are calculated as the percentage of firm-year observations in each sub-period (i.e., Column 2) multiplied by the total number of earnings strings in the sample (i.e., 889).

period exceeds that from the early-ES period by 0.0111, significant at the 1 percent level. On the other hand, the difference between the mean $DACC^{PM}$ for the break year and the corresponding mean $DACC^{PM}$ from the early-ES (late-ES) period is –0.0134 (–0.0245), significant at the 1 percent (1 percent) level (see Rows 5–6). Results based on the comparisons of median values across pairs of sub-periods are qualitatively similar. Taken together, these results lend support for the predictions of both Hypotheses 2A and 2B. Univariate comparisons however do not control for factors that may also affect the provision of discretionary accruals, an issue that I turn to next in a multivariate setting.

[Insert Table 2.4 about Here]

2.5.3 Results from Regression Analysis

Table 2.5 presents the regression results estimated using Equation (2-1) over the 845 ES firms (or 6,385 firm-year observations). After controlling for the potential effects of covariates, I find that the coefficient estimate on the *LateES* variable is positive and significant at the 1 percent level (0.0173, *t*-statistics = 4.15). Compared to the early-ES period, firms undertake significantly more aggressive discretionary accruals to inflate earnings in the final two years of an earnings string, as predicted in Hypothesis 2A. In contrast, the coefficient estimates on the *Break* variable is significantly negative (–0.0272, *t*-statistics = –4.65), implying less aggressive discretionary accruals during the year when earnings strings are broken than during the early-ES period. Discretionary accruals in the break year are also smaller than those in the late-ES period, as evident in the sign switch from positive for *LateES* to negative for *Break* (0.0173 vs. –0.0272). Both results are consistent with the prediction of Hypothesis 2B.

[Insert Table 2.5 about Here]

Recall from Panel B of Table 2.1 that 44 of the 845 ES firms in the sample have two earnings strings during the 19-year (1989–2007) sample period. Prior history of earnings strings may subject these ES firms to closer scrutiny from the auditors and regulators such that they are reluctant to use discretionary accruals to sustain the second earnings string. But, one may also argue that multiple-string firms face heavy pressure from investors to ensure that the second string does not break, as did the previous one. On balance, the net effect of these mixed incentives to sustain the second earnings string through accrual management is unclear. Thus, I replicate Equation (2-1) regression using a reduced sample of 801 firms, or equivalently 5,773 firm-year observations with only a single earnings string (labelled Subsample 1 hereinafter)[23], and report results in Column 1 of Table 2.6. All the main results continue to hold. In particular, the coefficient estimate on the *LateES* variable is significantly positive at the 1 percent level (0.0174, *t*-statistics = 3.92) and that on the *Break* variable is significantly negative at the 1 percent level (–0.0222, *t*-statistics = –3.55).

In selecting the ES sample, I have imposed a minimum length of five years on earnings strings, but not the upper bound. Just over half of the ES sample, or 445 out of 889 earnings strings, last from six to 18 years, whereas the

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[23] The sample size is smaller than the original ES sample by 612 observations, of which 304 observations relate to the first earnings string and 308 to the second string.

remaining 444 earnings strings have a length of exactly five years (see Panel D, Table 2.1). This implies significant variations in the length of early-ES period, ranging from three to 16 years. Since my research design treats the early-ES period as the reference group, cross-sectional variations in the length of this sub-period may affect the results. To address this concern, I next require all earnings strings to have the same length of five years, thus forcing the early-ES period to consist of three years for all firms. The requirement reduces the sample to 433 firms, or equivalently 2,664 firm-year observations (labelled Subsample 2 hereinafter).[24] Re-estimating Equation (2-1) regression on Subsample 2, I find that none of the results are altered (see Column 2, Table 2.6). As before, both the *LateES* and the *Break* variables are significant in the hypothesized directions (0.0183, *t*-statistics = 2.62; –0.0296, *t*-statistics = –3.24).

[Insert Table 2.6 about Here]

Taken together, these results indicate that firms undertake more aggressive accrual management near the end of an earnings string, compared to the other part of an earnings string. Moreover, the pattern of accrual management in the year when an earnings string is finally broken is contrary to that within the earnings string. These findings are invariant to my decision to allow earnings strings of length greater than five years to be part of the sample. Likewise, including firms

[24] It consists of 2,220 observations within an earnings string (444 strings x 5 years) and 444 observations from the break year (444 x 5 + 444 = 2,664). Among 444 earnings strings, 11 strings are the second string for firms that already have an earnings string. So, the exact number of firms is 433 (444 – 11 = 433).

with multiple earnings strings does not change any of the results qualitatively speaking.

2.5.4 Results from Sensitivity Analysis

Up to now, I have used performance-matched discretionary accruals as a proxy for the extent of earnings management. Matching each ES firm with a non-ES firm along the industry, year and firm performance dimensions has the advantage of holding constant potential confounding factors that may also contribute to cross-sectional differences in accrual management during the earnings string or the break year. However, this design choice assumes an equal number of ES and non-ES firms, an assumption that is unlikely to be representative of the actual distribution of these two types of firms in the market. To ensure that my findings remain robust, I replicate all the analyses using the performance-adjusted and performance-unadjusted discretionary accruals measures ($DACC^{PA}$ and *DACC*), estimated in a manner described in Section 2.4. Panels A–B (C) of Table 2.7 report univariate (multivariate) results using the original ES sample of 845 firms. The corresponding multivariate results for Subsamples 1 and 2 appear in Panels D and E, respectively.

Focusing first on the original ES sample, I find that the expected number of earnings strings whose peak level of $DACC^{PA}$ occurs in the late-ES period is 247, much lower than the observed number of 306 (see Columns 3–4, Panel A). The converse is true for the number of earnings strings that have a peak $DACC^{PA}$ in the early-ES period (518 vs. 477) or the break year (124 vs. 106). Results are qualitatively similar when performance-unadjusted discretionary accruals (*DACC*) are used instead, i.e., 247 vs. 345, 518 vs. 450 and 124 vs. 94 (see Columns 3 and 5, Panel A). In both cases, a *Chi-square* test of difference between the expected and observed frequency distributions rejects the null of no difference at the 1 percent level. The mean value of $DACC^{PA}$ from the late-ES period exceeds that from the early-ES period by 0.0156, significant at the 1 percent level (see Row 4, Panel B). In contrast, the mean value of $DACC^{PA}$ from the break year is less than the corresponding mean values from the early-ES and the late-ES periods, with both differences significant at the 1 percent level (–0.0147 and –0.0303; see Rows 5–6, Panel B). These univariate results continue to hold when I compare median values of $DACC^{PA}$ across the three sub-periods or if I extend the analysis to *DACC*.

Staying with the original ES sample, I find once again that the test variable *LateES* is significantly positive and the *Break* variable is significantly negative after controlling for the potential effects of covariates. Take the $DACC^{PA}$ regression for example, the coefficient estimates (*t*-statistics) on *LateES* and *Break* are 0.0222 (8.60) and –0.0249 (–6.43), respectively (see Column 1, Panel C). The corresponding values for the *DACC* regression are 0.0256 (9.34) and – 0.0275 (–6.43), respectively (see Column 2, Panel C). Both sets of results continue to hold for Subsamples 1 and 2 (see Panels D–E). In short, the main results are invariant to the choice of proxies for accrual management (i.e., $DACC^{PA}$ or *DACC*), lending further support for the predictions of Hypothesis 2A and Hypothesis 2B.

[Insert Table 2.7 about Here]

2.6 FURTHER ANALYSIS

In the main analysis, I have chosen to view the last two years of an earnings string as the late-ES period. This approach is motivated by Ke et al.'s (2003) findings that insiders start selling their shares three to nine quarters in advance of a break to an earnings string. To shed further light on the progression of accrual management within an earnings string, I now refine the definitions of ES period in three ways: First, allowing each year within the late-ES period to enter the model separately. Second, partitioning the early-ES period into the following two sub-periods, i.e., the first two years and the remaining years of the early-ES period. Third, modifying the definition of late-ES period and partitioning the early-ES period into two sub-periods.

For the first refinement, I replace the late-ES test variable, *LateES*, in Equation (2-1) with two new test variables, $-2Break$ and $-1Break$, defined as the second last and the last year of an earnings string, respectively. The resulting model is summarized below:

$$\begin{aligned} Y_{it} = \ & \beta_0 + \beta_1 \bullet -2Break_{it} + \beta_2 \bullet -1Break_{it} + \beta_3 \bullet Break_{it} \\ & + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} \\ & + \gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it} + \gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it} \qquad (2\text{-}3) \\ & + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it} \end{aligned}$$

As before, the early-ES period (i.e., the period between the beginning of an earnings string and three years before the break) is the base group in Equation (2-3). The variable $Break$ and all the control variables are as defined in Equation

(2-1). Panels A–C of Table 2.8 report multivariate results estimated based on Equation (2-3) using the original ES sample and Subsamples 1 and 2, respectively. In each panel, results on key variables corresponding to $DACC^{PM}$, $DACC^{PA}$ and *DACC* appear in Columns 1–3, respectively.

Regardless of the choice of samples and accrual proxies, the *Break* variable is negative and significant at the 1 percent level, whereas the coefficient estimates on the two new late-ES test variables, $-1Break$ and $-2Break$, are significantly positive. More importantly, the coefficients on $-1Break$ are consistently more positive with stronger *t*-statistics than the corresponding estimates on $-2Break$. Take the combination of $DACC^{PM}$ and original ES sample for example, they are given by 0.0224 (*t*-stat. = 4.35) and 0.0126 (*t*-stat. = 2.36), respectively (see Column 1, Panel A). For Subsamples 1 and 2, the corresponding coefficient estimates (*t*-stat.) on $-1Break$ vs. $-2Break$ are 0.0220 (3.96) vs. 0.0131 (2.34) and 0.0224 (2.74) vs. 0.0146 (1.69), respectively (see Column 1, Panels B–C). These results extend to the other two accrual proxies (i.e., $DACC^{PA}$ and *DACC*) and point to an increasing intensity of accrual management within the late-ES period.

[Insert Table 2.8 about Here]

For the second refinement, I estimate the following variation of Equation (2-1):

$$Y_{it} = \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet LateES_{it} + \beta_3 \bullet Break_{it}$$

$$+\gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it}$$

$$+\gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it} + \gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it} \qquad (2\text{-}4)$$

$$+\gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$$

where *MidES* is set equal to one if an observation falls in the period from the third year of an earnings string to three years before the break and zero otherwise.[25] The test variables, *LateES* and *Break*, along with all the control variables are as defined before. The reference group becomes the first two years of an earnings string in Equation (2-4). Panels A–C of Table 2.9 report results from estimating Equation (2-4) using the original ES sample and Subsamples 1 and 2, respectively.

Of particular interest in this analysis is the contrast involving coefficient estimates on the two test variables for the ES period, *MidES* and *LateES*. Results indicate that *LateES* is consistently positive and significant at the conventional levels. More importantly, the coefficient estimates on *LateES* are almost double the corresponding estimates on *MidES* with stronger *t*-statistics in all nine cases under investigation. When $DACC^{PM}$ is used as a proxy for accrual management, these coefficients (*t*-statistics) are given by 0.0262 (4.89) vs. 0.0136 (2.66) in the original ES sample (see Column 1, Panel A), and 0.0269 (4.62) vs. 0.0143 (2.57) and 0.0221 (2.94) vs. 0.0088 (0.99) in Subsamples 1 and 2, respectively (see Column 1, Panels B–C). As before, the *Break* variable is consistently negative and significant. Taken together, evidence suggests that accrual management may have started prior to the late-ES period.

[25] The number of years included in the mid-ES period ranges from one year for a five-year earnings string to 14 years for an 18-year earnings string in the original ES sample and Subsample 1.

[Insert Table 2.9 about Here]

In the previous refinements, I have considered the impact of modifying the definition of late-ES and early-ES periods separately. Before concluding this section, I combine these two refinements by estimating the following model:

$$
\begin{aligned}
Y_{it} = {} & \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet -2Break_{it} + \beta_3 \bullet -1Break_{it} + \beta_4 \bullet Break_{it} \\
& + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} \\
& + \gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it} + \gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it} \qquad (2\text{-}5) \\
& + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}
\end{aligned}
$$

where all the variables are as defined before. For this refinement, each earnings string is divided into five periods: early-ES period (i.e., the first two years of an earnings string), mid-ES period (i.e., the period from the third year of an earnings string to three years before the break), −2Break (i.e., two years before the break), −1Break (i.e., one year before the break), and the break year, where the reference group is given by the early-ES period. As is evident in Figures 2.2A and 2.2B, both the mean and the median values of discretionary accruals and changes in EPS rise steadily from the mid-ES period to one year before the break and then decline sharply at the break, a pattern consistent with the predictions of Hypotheses 2A and 2B.

[Insert Figures 2.2A and 2.2B about Here]

I next take a closer look at these trends based on an analysis of frequency distribution and comparisons of mean and median values. For brevity, I only report univariate results for the original ES sample in Table 2.10. When $DACC^{PM}$ is used as the proxy for accrual management, the observed numbers of earnings strings whose peak levels of discretionary accrual occur in the early-ES period, mid-ES period, −2Break year, −1Break year and the break year are 255, 243, 123, 164 and 104, respectively, and the corresponding expected numbers are 247, 270, 124, 124 and 124, respectively (see Columns 4 and 3, Panel A). These two distributions differ from each other, significant at the 1 percent level based on a *Chi-square* test. Results are qualitatively similar for the other two measures of discretionary accruals, i.e., $DACC^{PA}$ and *DACC* (see Columns 5–6, Panel A).[26]

Panel B of Table 2.10 presents the comparisons of mean and median values of three accrual measures ($DACC^{PM}$, $DACC^{PA}$ and *DACC*) for the five sub-periods, calculated over 1,778, 1,940, 889, 889 and 889 firm-year observations, respectively. The prediction of Hypothesis 2A is supported if the mean and median values from −1Break year are significantly larger than the corresponding values in the mid- and early-ES periods (see Rows 8–9). On the other hand, the prediction of Hypothesis 2B is consistent with a significantly smaller mean (or median) value in the Break year than in each of the four ES periods (see Rows 10–13). Both predictions are strongly supported at the conventional levels.[27]

Finally, I estimate Equation (2-5) for the original ES sample, Subsample 1 and Subsample 2 and report results in Panels C–E of Table 2.10, respectively. For

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[26] I also compute the expected and observed frequency distributions by pre-break year for all three accrual proxies. Denoting each pre-break year as −NBreak, where N is the number of years before the break, I find that in each case the observed numbers of earnings strings that have a peak level of discretionary accruals in −1Break year is significantly larger than the expected number, but is either significantly lower or statistically similar in the other pre-break years. A *Chi-square* test once again rejects the null of no difference at the 1 percent level. These results are available upon request.

[27] The mean and median values of all three accrual measures in −2Break year are either more positive or less negative than those in the mid- and early-ES periods. However, the differences are not always statistically significant (see Rows 6–7, Panel B).

all nine combinations of sample and accrual proxy, the coefficient estimates on $-1Break$ are consistently more positive with stronger *t*-statistics than those on $-2Break$. The latter variable in turn has larger coefficient estimates and stronger *t*-statistics than *MidES*. To conserve space, I will discuss results based on the $DACC^{PM}$ regressions only. After controlling for the potential effects of covariates, the coefficients (*t*-statistics) on $-1Break$, $-2Break$ and *MidES* in the original ES sample are 0.0315 (5.04), 0.0215 (3.45) and 0.0137 (2.68), respectively (see Column 1, Panel C). The corresponding values for Subsample 1 are 0.0318 (4.65), 0.0226 (3.39) and 0.0144 (2.59), respectively, whereas those for Subsample 2 are 0.0263 (2.98), 0.0184 (2.06) and 0.0089 (1.00), respectively (see Column 1, Panels D–E). The *Break* variable is consistently negative and significant at the conventional levels. While accrual management may have started earlier than predicted during the mid-ES period, the extent of accrual management is nonetheless much weaker than that observed near the end of an earnings string.

[Insert Table 2.10 about Here]

2.7 CONCLUSION

In Chapter 2, I have examined the patterns of discretionary accruals within an earnings string for firms reporting at least five-year consecutive earnings increases (i.e., ES firms) over a 19-year (1989–2007) period. I conjecture that ES firms are likely to use more aggressive discretionary accruals near the end of their earnings strings in order to prolong the appearance of earnings growth, but undertake less aggressive discretionary accruals in the year when an earnings string is finally broken.

Partitioning the earnings strings into three sub-periods (i.e., early-ES period, late-ES period and the break year), I find that ES firms report significantly larger discretionary accruals in the late-ES period, but much lower ones during the break year. These results are invariant to my choice of accrual proxies (i.e., performance-matched, performance-adjusted or performance-unadjusted discretionary accruals). They also continue to hold even if ES firms are allowed to have prior history of earning strings or if the length of their earning strings is fixed at five years. Further analysis based on a finer partitioning of early- and late-ES periods indicates that ES firms gradually increase the intensity of accrual management throughout an earning string. The level of intensity peaks in the year right before the break, and then declines sharply during the break year. The observed patterns of accrual management within an earning string are consistent with Ke et al.'s (2003) findings that insiders sell their shares about three to nine quarters before the break.

While I have focused on accrual management in Chapter 2, there are other means for firms to sustain earnings growth over an extended period of time. In Chapter 3, I will study one such commonly cited technique, i.e., real-activity management. I also plan to take a closer look at the market reaction to ES firms' earnings management and see if it differs across these two methods in Chapter 4. As a direction for future research, it may be interesting to investigate whether managers of ES firms have a stronger incentive to manage earnings if their compensation package includes stock options.

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Appendix 2-I
Definitions & Measurements of Variables in Chapter 2

Variables	Definitions & Measurements
Main Analysis (See Equation (2-1))	
Dependent Variable:	
$DACC^{PM}$	Performance-matched discretionary accruals, calculated as the difference between an ES firm *i*'s discretionary accruals estimated from the forward-looking modified-Jones model and discretionary accruals of a non-ES firm that has the closest *ROA* (return on assets, defined as net income deflated by opening total assets) in the same two-digit SIC industry-year group.
Test Variables:	
LateES	= 1, if a firm-year observation falls in the last two years of an earnings string; = 0 otherwise.
Break	= 1, if a firm-year observation falls in the break year of an earnings string; = 0 otherwise.
Control Variables:	
Size	Natural logarithm of market value of equity at the beginning of the fiscal year.
BTM	Book-to-market ratio at the beginning of the fiscal year.
Leverage	Total debts at the beginning of the fiscal year deflated by opening total assets.
CFO	Cash flow from operations scaled by opening total assets.
Loss	= 1, if a firm reports a net loss in the previous year; = 0 otherwise.
NewIssue	= 1, if a firm issues new equity; = 0 otherwise.
Litigation	= 1, if a firm's business belongs to the following industries; = 0 otherwise: Biotechnology (SIC 2833–2836, 8731–8734), Computer (SIC 3570–3577, 7370–7374), Electronics (SIC 3600–3674), and Retailing (SIC 5200–5961).
BigN	= 1, if a firm retains a Big-N auditor; = 0 otherwise.
IndustryDummy	37 dummies for two-digit SIC industry group.
YearDummy	19 dummies for fiscal year.

(The appendix is continued on the next page.)

Appendix 2-I (Continued)

Variables	Definitions & Measurements
Discretionary Accrual Estimation Model (See Equation (2-2) and Appendix 2-II)	
TAC	Total accruals (income before extraordinary items − cash flow from operations).
TA	Total assets.
ΔS	Change in sales.
ΔREC	Change in account receivables from trade.
k	Estimated slope coefficient from a regression of $\Delta REC/TA$ on $\Delta S/TA$ for each two-digit SIC industry-year group.
PPE	Property, Plant & Equipment (Gross).
S	Sales (net).
DACC	Discretionary accruals, the residuals estimated from the forward-looking modified-Jones model.
Sensitivity Analysis	
$DACC^{PA}$	Performance-adjusted discretionary accruals, calculated as the difference between an ES firm *i*'s discretionary accruals estimated from the forward-looking modified-Jones model and the median discretionary accruals of the *ROA* decile in the same two-digit SIC industry-year group.
Further Analysis (See Equations (2-3), (2-4), and (2-5))	
−2Break	= 1, if a firm-year observation falls in two years before the break of an earnings string; = 0 otherwise.
−1Break	= 1, if a firm-year observation falls in one year before the break of an earnings string; = 0 otherwise.
MidES	= 1, if a firm-year observation falls in the period from the third year of an earnings string to three years before the break of an earnings string; = 0 otherwise.

Appendix 2-II
Estimation of Discretionary Accruals

To calculate discretionary accruals, I follow Dechow, Richardson and Tuna (2003) and estimate the following forward-looking modified-Jones model cross-sectionally for every two-digit SIC industry-year group with at least 20 observations over 1989–2007:

$$\frac{TAC_{it}}{TA_{it-1}} = \alpha_1 \frac{1}{TA_{it-1}} + \alpha_2 \frac{(1+k)\Delta S_{it} - \Delta REC_{it}}{TA_{it-1}} + \alpha_3 \frac{PPE_{it}}{TA_{it-1}} + \alpha_4 \frac{TAC_{it-1}}{TA_{it-2}} + \alpha_5 \frac{\Delta S_{it+1}}{S_{it}} + \varepsilon_{i.t}$$

All variables are winsorized at the top and bottom 1 percent of their respective distributions. Consistent with prior research (Kothari, Leone and Wasley 2005), an observation is deleted if the absolute value of its total accruals deflated by opening total assets is greater than one. The residuals represent discretionary accruals (denoted as *DACC*).

A summary of the mean value of each estimated coefficient across 701 industry-years, along with *t*-statistics calculated using the standard error of the mean across 701 industry-years, is presented below. The adjusted R^2 is the mean adjusted R^2 over 701 industry-years.

	Mean Value of Estimated Coefficient (*t*-statistics)
$\frac{1}{TA_{it-1}}$	−0.1497 (−4.03)***
$\frac{(1+k)\Delta S_{it} - \Delta REC_{it}}{TA_{it-1}}$	0.0228 (7.05)***
$\frac{PPE_{it}}{TA_{it-1}}$	−0.0679 (−45.15)***
$\frac{TAC_{it-1}}{TA_{it-2}}$	0.1791 (20.52)***
$\frac{\Delta S_{it+1}}{S_{it}}$	0.0292 (7.72)***
Mean Adjusted R^2 (in %) = 39.03%	

Note 1: ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).

Please refer to **Appendix 2-I** for variable definitions and measurements.

TABLE 2.1
Sample and Data

Panel A: **Sample Selection Process**

	Number of Earnings Strings	Number of Observations
Total number of earnings strings (ES)[1]/observations collected from COMPUSTAT Fundamental Annual Database (1989–2007)	1,347	8,369
Less: Final year of earnings strings fell in 2007	(308)	(1,976)
Less: Missing data in the break year	(150)	(897)
Number of earnings strings/observations with clearly identifiable break year (excluding the break year)	889	5,496
Number of observations in the break year[2]		889
The ES sample (1989–2007)	889	6,385

Note 1: An earnings string (ES) is defined as a string of increases in EPS for at least five years.
Note 2: While the break year is not part of an earning string, it is included in the original ES sample to test the prediction of Hypothesis 2B.

Panel B: **Composition of the ES Sample (1989–2007)**

	N	%
Number of first strings	845	95.05%
Number of second strings	44	4.95%
Total number of earnings strings	889	100.00%
Number of distinct firms with one earnings string	801	94.79%
Number of distinct firms with two earnings strings	44	5.21%
Total number of distinct firms with an ES	845	100.00%

(The table is continued on the next page.)

TABLE 2.1 (Continued)

Panel C: Industrial Distribution of the ES Sample (1989–2007)

	ES Sample				**COMPUSTAT Population**[1]	
	(# of Firms)		**(# of Obs.)**		**(# of Obs.)**	
Industry (two-digit SIC)	**N**	**%**	**N**	**%**	**N**	**%**
Mining & Construction (10–12,14–19)	1	0.12%	6	0.09%	1,402	1.81%
Oil & Gas (13,29)	25	2.96%	163	2.55%	4,853	6.26%
Food products (20–21)	34	4.02%	282	4.42%	2,218	2.86%
Textiles (22–27)	63	7.45%	474	7.43%	5,002	6.45%
Chemical products (28)	84	9.94%	678	10.62%	7,831	10.11%
Manufacturing (30–34)	64	7.57%	470	7.36%	5,121	6.61%
Computer equipment (35)	63	7.46%	473	7.41%	6,050	7.81%
Electronic equipment (36)	82	9.70%	606	9.49%	7,978	10.29%
Transportation (37,39–43)	45	5.33%	351	5.50%	3,847	4.96%
Scientific instruments (38)	80	9.47%	578	9.05%	6,290	8.12%
Retail (50–59)	146	17.28%	1,131	17.71%	9,632	12.43%
Services (70–89)	152	17.99%	1,131	17.71%	16,214	20.92%
Other (90–99)	6	0.71%	42	0.66%	1,061	1.37%
Total	845	100.00%	6,385	100.00%	77,499	100.00%

Note 1: Regulated industry (4400–5000) and Financial industry (6000–6999) are excluded. Any firm-year observations with missing data to calculate model variables are also deleted.

(The table is continued on the next page.)

TABLE 2.1 (Continued)

Panel D: <u>Length of Earnings Strings (1989–2007)</u>

Length of ES	Frequency	%
5	444	49.95%
6	202	22.73%
7	89	10.02%
8	62	6.97%
9	44	4.95%
10	19	2.14%
11	10	1.12%
12	10	1.12%
13	4	0.45%
14	2	0.22%
15	1	0.11%
16	1	0.11%
17	0	0.00%
18	1	0.11%
Total	889	100.00%

TABLE 2.2
Variable Distribution for the Original ES Sample (1989–2007; N = 889 Earnings Strings)

	Mean	Std Dev	Min	25%	50%	75%	Max	N (Obs.)
$DACC^{PM}$	−0.0113	0.1473	−0.8363	−0.0822	−0.0097	0.0593	1.0517	6,385
$DACC^{PA}$	−0.0037	0.1006	−0.7251	−0.0507	−0.0067	0.0403	0.9793	6,385
DACC	0.0012	0.0972	−0.6588	−0.0386	0.0013	0.0453	0.7947	6,385
Size	5.6778	2.2100	0.5852	4.1004	5.6780	7.2466	10.8882	6,385
BTM	0.4611	0.4263	−0.4887	0.2104	0.3576	0.5829	2.3739	6,385
Leverage	0.1863	0.1814	0.0000	0.0216	0.1481	0.2923	0.8454	6,385
CFO	0.1112	0.1706	−0.6776	0.0602	0.1272	0.1956	0.5149	6,385
Loss	0.1634	0.3697	0.0000	0.0000	0.0000	0.0000	1.0000	6,385
NewIssue	0.8293	0.3763	0.0000	1.0000	1.0000	1.0000	1.0000	6,385
Litigation	0.3677	0.4822	0.0000	0.0000	0.0000	1.0000	1.0000	6,385
BigN	0.8678	0.3387	0.0000	1.0000	1.0000	1.0000	1.0000	6,385

Note 1: All continuous control variables are winsorized at the top and bottom 1 percent of their respective distributions.

Please refer to **Appendix 2-I** for variable definitions and measurements.

TABLE 2.3
Pearson and Spearman Correlations for the Original ES Sample (1989–2007; N = 889 Earnings Strings)

	$DACC^{PM}$	$DACC^{PA}$	*DACC*	*Size*	*BTM*	*Leverage*	*CFO*	*Loss*	*NewIssue*	*Litigation*	*BigN*
$DACC^{PM}$	**1.0000**	*0.6474*	*0.5713*	*−0.1107*	*0.0354*	*0.0279*	*−0.3765*	*0.1035*	*0.0005*	*−0.0147*	*−0.0444*
		<.0001	*<.0001*	*<.0001*	*0.0047*	*0.0258*	*<.0001*	*<.0001*	*0.9697*	*0.2407*	*0.0004*
$DACC^{PA}$	*0.6252*	**1.0000**	*0.8675*	*−0.1497*	*0.0203*	*0.0115*	*−0.4712*	*0.1219*	*0.0024*	*−0.0253*	*−0.0503*
	<.0001		*<.0001*	*<.0001*	*0.1044*	*0.3604*	*<.0001*	*<.0001*	*0.8488*	*0.0431*	*<.0001*
DACC	*0.5654*	*0.8429*	**1.0000**	*−0.0515*	*0.0088*	*−0.0290*	*−0.2285*	*−0.0989*	*0.0090*	*−0.0591*	*−0.0090*
	<.0001	*<.0001*		*<.0001*	*0.4798*	*0.0203*	*<.0001*	*<.0001*	*0.4725*	*<.0001*	*0.4730*
Size	*−0.1045*	*−0.1377*	*−0.0668*	**1.0000**	*−0.3942*	*−0.0462*	*0.3025*	*−0.3772*	*0.2162*	*0.0804*	*0.3337*
	<.0001	*<.0001*	*<.0001*		*<.0001*	*0.0002*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*
BTM	*0.0527*	*0.0446*	*0.0312*	*−0.3788*	**1.0000**	*0.0181*	*−0.0697*	*0.0905*	*−0.2480*	*−0.1195*	*−0.0634*
	<.0001	*0.0004*	*0.0128*	*<.0001*		*0.1487*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*
Leverage	*0.0364*	*0.0132*	*−0.0260*	*0.0159*	*0.1254*	**1.0000**	*−0.1226*	*0.1078*	*−0.0720*	*−0.1661*	*−0.0130*
	0.0036	*0.2928*	*0.0378*	*0.2050*	*<.0001*		*<.0001*	*<.0001*	*<.0001*	*<.0001*	*0.3009*
CFO	*−0.3765*	*−0.5134*	*−0.3777*	*0.2820*	*−0.2230*	*−0.2150*	**1.0000**	*−0.5170*	*0.0066*	*0.0076*	*0.1291*
	<.0001	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*		*<.0001*	*0.5958*	*0.5429*	*<.0001*
Loss	*0.0814*	*0.1088*	*−0.0753*	*−0.3696*	*−0.0141*	*0.0537*	*−0.4214*	**1.0000**	*−0.0788*	*0.0821*	*−0.1403*
	<.0001	*<.0001*	*<.0001*	*<.0001*	*0.2587*	*<.0001*	*<.0001*		*<.0001*	*<.0001*	*<.0001*
NewIssue	*−0.0048*	*−0.0077*	*0.0001*	*0.2011*	*−0.1943*	*−0.0540*	*0.0420*	*−0.0788*	**1.0000**	*0.1380*	*0.1105*
	0.6994	*0.5397*	*0.9933*	*<.0001*	*<.0001*	*<.0001*	*0.0008*	*<.0001*		*<.0001*	*<.0001*
Litigation	*−0.0122*	*−0.0219*	*−0.0338*	*0.0725*	*−0.1799*	*−0.1873*	*0.0746*	*0.0821*	*0.1380*	**1.0000**	*0.0272*
	0.3283	*0.0803*	*0.0070*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*	*<.0001*		*0.0297*
BigN	*−0.0353*	*−0.0456*	*−0.0197*	*0.3184*	*−0.0197*	*0.0173*	*0.1183*	*−0.1403*	*0.1105*	*0.0272*	**1.0000**
	0.0048	*0.0003*	*0.1149*	*<.0001*	*0.1159*	*0.1667*	*<.0001*	*<.0001*	*<.0001*	*0.0297*	

Note 1: *Pearson* correlation coefficients are reported above the diagonal and *Spearman* rank correlation coefficients are reported below the diagonal. The corresponding *p*-values appear underneath the correlation coefficients.

Please refer to **Appendix 2-I** for variable definitions and measurements.

TABLE 2.4
Univariate Tests for the Original ES Sample (1989–2007; N = 889 Earnings Strings)

Panel A: **Frequency Distribution of the Peak Level of $DACC^{PM}$**

Period	Total Firm-Year Observations		Expected Number of Peaks	Observed Number of Peaks
	(1). N	(2). %	(3) = 889 * (2)	(4)
Early-ES	3,718	58.23%	518	498
Late-ES	1,778	27.85%	247	287
Break Year	889	13.92%	124	104
Total	6,385	100.00%	889	889

Chi-square	11.8409
p-value	0.0027

Panel B: **Mean and Median Comparisons**

		Mean	Median	N
(1)	**Early-ES**	−0.0126	−0.0130	3,718
(2)	**Late-ES**	−0.0015	−0.0003	1,778
(3)	**Break Year**	−0.0260	−0.0173	889
(4)	**(2) − (1)**	0.0111 ***	0.0127 ***	
(5)	**(3) − (1)**	−0.0134 ***	−0.0043 **	
(6)	**(3) − (2)**	−0.0245 ***	−0.0170 ***	

Note 1: Early-ES, Late-ES and Break Year are defined as the period from the first year to the third last year of an earnings string, the final two years of an earnings string and the year immediately following the end of an earnings string, respectively.
Note 2: In **Panel B**, mean comparisons are based on *t*-tests and median comparisons are based on Wilcoxon tests. ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).

TABLE 2.5
Regression Results based on the Original ES Sample

Sample Period: 1989–2007
Model: $DACC_{it}^{PM} = \beta_0 + \beta_1 \bullet LateES_{it} + \beta_2 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1}$
$+ \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} + \gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it}$
$+ \gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it} + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$

	Prediction	Coeff.	*t*-stat	*p*-value
Test Variables				
LateES	+	0.0173	4.15	<.0001
Break	−	−0.0272	−4.65	<.0001
Control Variables				
Size		−0.0012	−1.01	0.3120
BTM		0.0038	0.67	0.5014
Leverage		−0.0197	−1.51	0.1321
CFO		−0.4085	−17.97	<.0001
Loss		−0.0564	−8.63	<.0001
NewIssue		0.0017	0.36	0.7218
Litigation		−0.0134	−1.81	0.0713
BigN		−0.0012	−0.20	0.8399
YearDummy			Yes	
IndustryDummy			Yes	
Adjusted R^2			16.73%	
N			6,385 firm-year obs. (889 earnings strings)	

Note 1: $DACC^{PM}$ represents the performance-matched discretionary accruals, defined as the difference between an ES sample firm's discretionary accruals and the discretionary accruals of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group.
Note 2: All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 2-I** for variable definitions and measurements.

TABLE 2.6
Regression Results based on Alternative ES Samples

Sample Period: 1989–2007
Model: $DACC_{it}^{PM} = \beta_0 + \beta_1 \bullet LateES_{it} + \beta_2 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1}$
$+ \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} + \gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it}$
$+ \gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it} + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$

	Prediction	(1). Subsample 1			(2). Subsample 2		
		Coeff.	*t*-stat	*p*-value	Coeff.	*t*-stat	*p*-value
Test Variables							
LateES	+	0.0174	3.92	<.0001	0.0183	2.62	0.0045
Break	−	−0.0222	−3.55	0.0002	−0.0296	−3.24	0.0007
Control Variables							
Size		−0.0012	−0.90	0.3700	−0.0015	−0.82	0.4104
BTM		0.0052	0.89	0.3759	0.0020	0.27	0.7836
Leverage		−0.0157	−1.15	0.2503	−0.0092	−0.46	0.6422
CFO		−0.4021	−17.17	<.0001	−0.4333	−15.28	<.0001
Loss		−0.0573	−8.60	<.0001	−0.0447	−4.91	<.0001
NewIssue		0.0017	0.34	0.7316	0.0023	0.31	0.7594
Litigation		−0.0147	−1.85	0.0648	−0.0265	−2.50	0.0129
BigN		−0.0033	−0.53	0.5974	−0.0015	−0.15	0.8813
YearDummy			Yes			Yes	
IndustryDummy			Yes			Yes	
Adjusted R^2			16.45%			19.88%	
N			5,773 firm-year obs. (801 earnings strings)			2,664 firm-year obs. (444 earnings strings)	

Note 1: $DACC^{PM}$ represents the performance-matched discretionary accruals, defined as the difference between an ES sample firm's discretionary accruals and the discretionary accruals of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group.
Note 2: All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.
Note 3: In Column (1), Subsample 1 consists of 801 ES firms with only one earnings string. Its sample size (5,773 observations) is smaller than the original ES sample by 612 firm-year observations, of which 304 relate to the first earnings string and 308 to the second string.
Note 4: In Column (2), Subsample 2 consists of 433 ES firms with five-year length of an earnings string. Among 444 earnings strings, 11 are the second string for a particular firm. The corresponding firm-year observations are 2,664, of which 2,220 within an earnings string and 444 from the break year (444 strings x 5 year + 444 observations from the break year = 2,664 firm-year observations).

Please refer to **Appendix 2-I** for variable definitions and measurements.

TABLE 2.7
Sensitivity Tests using Alternative Measures of Discretionary Accruals

Sample Period: 1989–2007
Model used in Panels C–E: $Y_{it} = \beta_0 + \beta_1 \bullet LateES_{it} + \beta_2 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1}$
$+\gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} + \gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it}$
$+\gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it} + \gamma_j \bullet IndustryDummy$
$+\gamma_t \bullet YearDummy + \varepsilon_{it}$

Panel A: Frequency Distribution of Peak of AM based on the Original ES Sample

Period	Total Firm-Year Observations		Expected Number of Peaks	Observed Number of Peaks	
	(1). N	(2). %	(3) = 889 * (2)	(4) $DACC^{PA}$	(5) *DACC*
Early-ES	3,718	58.23%	518	477	450
Late-ES	1,778	27.85%	247	306	345
Break Year	889	13.92%	124	106	94
Total	6,385	100.00%	889	889	889
			Chi-square	22.7076	63.1594
			p-value	<.0001	<.0001

Panel B: Mean and Median Comparisons based on the Original ES Sample

		(1). $DACC^{PA}$		(2). *DACC*	
		Mean	**Median**	**Mean**	**Median**
(1)	**Early-ES**	−0.0060	−0.0092	−0.0031	−0.0011
(2)	**Late-ES**	0.0096	0.0022	0.0209	0.0111
(3)	**Break Year**	−0.0207	−0.0137	−0.0201	−0.0065
(4)	**(2) − (1)**	0.0156 ***	0.0114 ***	0.0240 ***	0.0122 ***
(5)	**(3) − (1)**	−0.0147 ***	−0.0045 ***	−0.0170 ***	−0.0054 ***
(6)	**(3) − (2)**	−0.0303 ***	−0.0159 ***	−0.0410 ***	−0.0176 ***

(The table is continued on the next page.)

TABLE 2.7 (Continued)

Panel C: <u>Multivariate Results based on the Original ES Sample</u>

	Y_{it}	(1). $DACC^{PA}$			(2). $DACC$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
Test Variable							
LateES	+	0.0222	8.60	<.0001	0.0256	9.34	<.0001
Break	−	−0.0249	−6.43	<.0001	−0.0275	−6.43	<.0001
Adjusted R^2		28.42%			15.82%		
N		6,385 firm-year obs. (889 earnings strings)			6,385 firm-year obs. (889 earnings strings)		

Panel D: <u>Multivariate Results based on Subsample 1 (One Earnings String Only)</u>

	Y_{it}	(1). $DACC^{PA}$			(2). $DACC$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
Test Variable							
LateES	+	0.0231	8.30	<.0001	0.0269	9.06	<.0001
Break	−	−0.0245	−5.87	<.0001	−0.0265	−5.71	<.0001
Adjusted R^2		28.06%			15.55%		
N		5,773 firm-year obs. (801 earnings strings)			5,773 firm-year obs. (801 earnings strings)		

(The table is continued on the next page.)

TABLE 2.7 (Continued)

Panel E: **Multivariate Results based on Subsample 2 (Five-year Earnings String Only)**

	Y_{it}	(1). $DACC^{PA}$			(2). $DACC$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
Test Variable							
LateES	+	0.0219	4.90	<.0001	0.0286	5.90	<.0001
Break	−	−0.0371	−5.39	<.0001	−0.0381	−4.91	<.0001
Adjusted R^2		29.42%			14.84%		
N		2,664 firm-year obs. (444 earnings strings)			2,664 firm-year obs. (444 earnings strings)		

Note 1: $DACC^{PA}$ and $DACC$ represent performance-adjusted and performance-unadjusted discretionary accruals, respectively. $DACC^{PA}$ is calculated as the difference between an ES sample firm's discretionary accruals and the median discretionary accruals for that firm's industry-*ROA* decile in the same year. *DACC* is defined as the residuals from the forward-looking modified-Jones model (summarized in Appendix 2-II).
Note 2: In **Panels A–B**, Early-ES, Late-ES and Break Year are defined as the period from the first year to the third last year of an earnings string, the final two years of an earnings string and the year immediately following the end of an earnings string, respectively.
Note 3: In **Panel B**, mean comparisons are based on *t*-tests and median comparisons are based on Wilcoxon tests. ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).
Note 4: In **Panels C–E**, *LateES* and *Break* are the test variables in Equation (2-1), representing the last two years of an earnings string and the year immediately following the end of an earnings string, respectively. Results on control variables are not reported to conserve space. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 2-I** for variable definitions and measurements.

TABLE 2.8
Further Analysis using a more Refined Definition of Late-ES Period

Sample Period: 1989–2007
Model: $Y_{it} = \beta_0 + \beta_1 \bullet -2Break_{it} + \beta_2 \bullet -1Break_{it} + \beta_3 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1}$
$+\gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} + \gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it}$
$+\gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it} + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$

Panel A: Multivariate Results based on the Original ES Sample

Y_{it}		**(1). $DACC^{PM}$**			**(2). $DACC^{PA}$**			**(3). $DACC$**		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
−2Break	+	0.0126	2.36	0.0093	0.0137	4.18	<.0001	0.0143	4.15	<.0001
−1Break	+	0.0224	4.35	<.0001	0.0316	9.10	<.0001	0.0381	10.40	<.0001
Break	−	−0.0268	−4.58	<.0001	−0.0241	−6.26	<.0001	−0.0265	−6.22	<.0001
Adj. R^2		16.75%			28.62%			16.20%		
N		6,385 firm-year obs. (889 earnings strings)			6,385 firm-year obs. (889 earnings strings)			6,385 firm-year obs. (889 earnings strings)		

Panel B: Multivariate Results based on Subsample 1 (One Earnings String Only)

Y_{it}		**(1). $DACC^{PM}$**			**(2). $DACC^{PA}$**			**(3). $DACC$**		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
−2Break	+	0.0131	2.34	0.0098	0.0140	4.00	<.0001	0.0147	3.98	<.0001
−1Break	+	0.0220	3.96	<.0001	0.0331	8.75	<.0001	0.0404	10.10	<.0001
Break	−	−0.0218	−3.49	0.0003	−0.0237	−5.71	<.0001	−0.0254	−5.49	<.0001
Adj. R^2		16.46%			28.28%			15.98%		
N		5,773 firm-year obs. (801 earnings strings)			5,773 firm-year obs. (801 earnings strings)			5,773 firm-year obs. (801 earnings strings)		

(The table is continued on the next page.)

TABLE 2.8 (Continued)

Panel C: Multivariate Results based on Subsample 2 (Five-year Earnings String Only)

Y_{it}		(1). $DACC^{PM}$			(2). $DACC^{PA}$			(3). $DACC$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
−2Break	+	0.0146	1.69	0.0458	0.0128	2.25	0.0126	0.0159	2.64	0.0043
−1Break	+	0.0224	2.74	0.0032	0.0323	5.77	<.0001	0.0430	6.95	<.0001
Break	−	−0.0292	−3.21	0.0007	−0.0360	−5.28	<.0001	−0.0366	−4.74	<.0001
Adj. R^2		19.87%			29.62%			15.26%		
N		2,664 firm-year obs. (444 earnings strings)			2,664 firm-year obs. (444 earnings strings)			2,664 firm-year obs. (444 earnings strings)		

Note 1: $DACC^{PM}$, $DACC^{PA}$ and *DACC* represent performance-matched, performance-adjusted and performance-unadjusted discretionary accruals, respectively. $DACC^{PM}$ is defined as the difference between an ES sample firm's discretionary accruals and the discretionary accruals of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group. $DACC^{PA}$ is calculated as the difference between an ES sample firm's discretionary accruals and the median discretionary accruals for that firm's industry-*ROA* decile in the same year. *DACC* is defined as the residuals from the forward-looking modified-Jones model (summarized in Appendix 2-II).
Note 2: *−2Break*, *−1Break* and *Break* are the test variables in Equation (2-3), representing the second last year of an earnings string, the last year of an earnings string and the year immediately following the end of an earnings string, respectively. Results on control variables are not reported to conserve space. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 2-I** for variable definitions and measurements.

TABLE 2.9
Further Analysis using a more Refined Definition of Early-ES Period

Sample Period: 1989–2007
Model: $Y_{it} = \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet LateES_{it} + \beta_3 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1}$
$+\gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} + \gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it} + \gamma_7 \bullet Litigation_{it}$
$+\gamma_8 \bullet BigN_{it} + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$

Panel A: Multivariate Results based on the Original ES Sample

Y_{it}		(1). $DACC^{PM}$			(2). $DACC^{PA}$			(3). $DACC$		
	Prediction	Coeff.	*t*-stat	*p*-value	Coeff.	*t*-stat	*p*-value	Coeff.	*t*-stat	*p*-value
MidES	?	0.0136	2.66	0.0079	0.0058	1.94	0.0527	0.0095	3.10	0.0020
LateES	+	0.0262	4.89	<.0001	0.0260	7.76	<.0001	0.0318	8.82	<.0001
Break	–	−0.0182	−2.63	0.0044	−0.0210	−4.75	<.0001	−0.0212	−4.35	<.0001
Adj. R^2		16.82%			28.45%			15.91%		
N		6,385 firm-year obs. (889 earnings strings)			6,385 firm-year obs. (889 earnings strings)			6,385 firm-year obs. (889 earnings strings)		

Panel B: Multivariate Results based on Subsample 1 (One Earnings String Only)

Y_{it}		(1). $DACC^{PM}$			(2). $DACC^{PA}$			(3). $DACC$		
	Prediction	Coeff.	*t*-stat	*p*-value	Coeff.	*t*-stat	*p*-value	Coeff.	*t*-stat	*p*-value
MidES	?	0.0143	2.57	0.0102	0.0062	1.92	0.0553	0.0103	3.07	0.0022
LateES	+	0.0269	4.62	<.0001	0.0272	7.37	<.0001	0.0338	8.47	<.0001
Break	–	−0.0125	−1.66	0.0487	−0.0203	−4.18	<.0001	−0.0195	−3.63	0.0002
Adj. R^2		16.54%			28.09%			15.66%		
N		5,773 firm-year obs. (801 earnings strings)			5,773 firm-year obs. (801 earnings strings)			5,773 firm-year obs. (801 earnings strings)		

(The table is continued on the next page.)

TABLE 2.9 (Continued)

Panel C: Multivariate Results based on Subsample 2 (Five-year Earnings String Only)

Y_{it}		**(1). *$DACC^{PM}$***			**(2). *$DACC^{PA}$***			**(3). *DACC***		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
MidES	?	0.0088	0.99	0.3246	0.0048	0.91	0.3625	0.0111	1.95	0.0519
LateES	+	0.0221	2.94	0.0017	0.0240	4.70	<.0001	0.0334	6.01	<.0001
Break	−	−0.0258	−2.70	0.0036	−0.0350	−4.88	<.0001	−0.0333	−4.11	<.0001
Adj. R^2		19.88%			29.41%			14.90%		
N		2,664 firm-year obs. (444 earnings strings)			2,664 firm-year obs. (444 earnings strings)			2,664 firm-year obs. (444 earnings strings)		

Note 1: *$DACC^{PM}$*, *$DACC^{PA}$* and *DACC* represent performance-matched, performance-adjusted and performance-unadjusted discretionary accruals, respectively. *$DACC^{PM}$* is defined as the difference between an ES sample firm's discretionary accruals and the discretionary accruals of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group. *$DACC^{PA}$* is calculated as the difference between an ES sample firm's discretionary accruals and the median discretionary accruals for that firm's industry-*ROA* decile in the same year. *DACC* is defined as the residuals from the forward-looking modified-Jones model (summarized in Appendix 2-II).
Note 2: *MidES*, *LateES* and *Break* are the test variables in Equation (2-4), representing the period from the third year of an earnings string to three years before the break, the last two years of an earnings string and the year immediately following the end of an earnings string, respectively. Results on control variables are not reported to conserve space. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 2-I** for variable definitions and measurements.

TABLE 2.10
Further Analysis using a more Refined Definition of Early-ES and Late-ES Periods

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Sample Period: 1989–2007
Model used in Panels C–E: $Y_{it} = \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet -2Break_{it} + \beta_3 \bullet -1Break_{it}$

$+\beta_4 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it}$

$+\gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it} + \gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it}$

$+\gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$

Panel A: **Frequency Distribution of Peak of AM based on the Original ES Sample**

Period	Total Firm-Year Observations		Expected Number of Peaks	Observed Number of Peaks		
				DACC^PM	***DACC^PA***	***DACC***
	(1). N	**(2). %**	**(3) = 889 * (2)**	**(4)**	**(5)**	**(6)**
Early-ES	1,778	27.85%	247	255	256	234
Mid-ES	1,940	30.39%	270	243	221	216
−2Break	889	13.92%	124	123	124	118
−1Break	889	13.92%	124	164	182	227
Break Year	889	13.92%	124	104	106	94
Total	6,385	100.00%	889	889	889	889
			Chi-square	22.2831	45.4914	122.0958
			p-value	0.0002	<.0001	<.0001

(The table is continued on the next page.)

TABLE 2.10 (Continued)

Panel B: Mean and Median Comparisons based on the Original ES Sample

		(1). $DACC^{PM}$		(2). $DACC^{PA}$		(3). $DACC$	
		Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**
(1)	**Early-ES**	−0.0104	−0.0149	−0.0026	−0.0059	−0.0083	−0.0036
(2)	**Mid-ES**	−0.0145	−0.0114	−0.0091	−0.0119	0.0016	0.0009
(3)	**−2Break**	−0.0075	−0.0097	0.0004	−0.0039	0.0087	0.0026
(4)	**−1Break**	0.0045	0.0084	0.0187	0.0074	0.0331	0.0200
(5)	**Break Year**	−0.0260	−0.0173	−0.0207	−0.0137	−0.0201	−0.0065
(6)	**(3) − (2)**	0.0070	0.0017	0.0095 **	0.0080 ***	0.0071 *	0.0017 *
(7)	**(3) − (1)**	0.0029	0.0052	0.0030	0.0020	0.0170 ***	0.0062 ***
(8)	**(4) − (2)**	0.0190***	0.0198***	0.0278 ***	0.0193 ***	0.0315 ***	0.0191 ***
(9)	**(4) − (1)**	0.0149**	0.0233***	0.0213 ***	0.0133 ***	0.0414 ***	0.0236 ***
(10)	**(5) − (2)**	−0.0115**	−0.0059**	−0.0116***	−0.0018 **	−0.0217 ***	−0.0074 ***
(11)	**(5) − (1)**	−0.0156***	−0.0024*	−0.0181***	−0.0078 ***	−0.0118 ***	−0.0029 **
(12)	**(5) − (3)**	−0.0185***	−0.0076***	−0.0211***	−0.0098 ***	−0.0288 ***	−0.0091 ***
(13)	**(5) − (4)**	−0.0305***	−0.0257***	−0.0394***	−0.0211 ***	−0.0532 ***	−0.0265 ***

(The table is continued on the next page.)

TABLE 2.10 (Continued)

Panel C: Multivariate Results based on the Original ES Sample

Y_{it}		(1). $DACC^{PM}$			(2). $DACC^{PA}$			(3). $DACC$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
MidES	?	0.0137	2.68	0.0075	0.0059	2.00	0.0462	0.0097	3.17	0.0016
−2Break	+	0.0215	3.45	0.0003	0.0175	4.67	<.0001	0.0206	5.18	<.0001
−1Break	+	0.0315	5.04	<.0001	0.0356	8.37	<.0001	0.0446	9.78	<.0001
Break	−	−0.0177	−2.55	0.0054	−0.0201	−4.55	<.0001	−0.0200	−4.11	<.0001
Adj. R^2		16.83%			28.65%			16.30%		
N		6,385 firm-year obs. (889 earnings strings)			6,385 firm-year obs. (889 earnings strings)			6,385 firm-year obs. (889 earnings strings)		

Panel D: Multivariate Results based on Subsample 1 (One Earnings String Only)

Y_{it}		(1). $DACC^{PM}$			(2). $DACC^{PA}$			(3). $DACC$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
MidES	?	0.0144	2.59	0.0098	0.0064	1.98	0.0481	0.0106	3.15	0.0017
−2Break	+	0.0226	3.39	0.0004	0.0182	4.46	<.0001	0.0217	4.99	<.0001
−1Break	+	0.0318	4.65	<.0001	0.0375	7.98	<.0001	0.0476	9.45	<.0001
Break	−	−0.0120	−1.60	0.0553	−0.0193	−3.98	<.0001	−0.0181	−3.38	0.0004
Adj. R^2		16.55%			28.31%			16.10%		
N		5,773 firm-year obs. (801 earnings strings)			5,773 firm-year obs. (801 earnings strings)			5,773 firm-year obs. (801 earnings strings)		

(The table is continued on the next page.)

TABLE 2.10 (Continued)

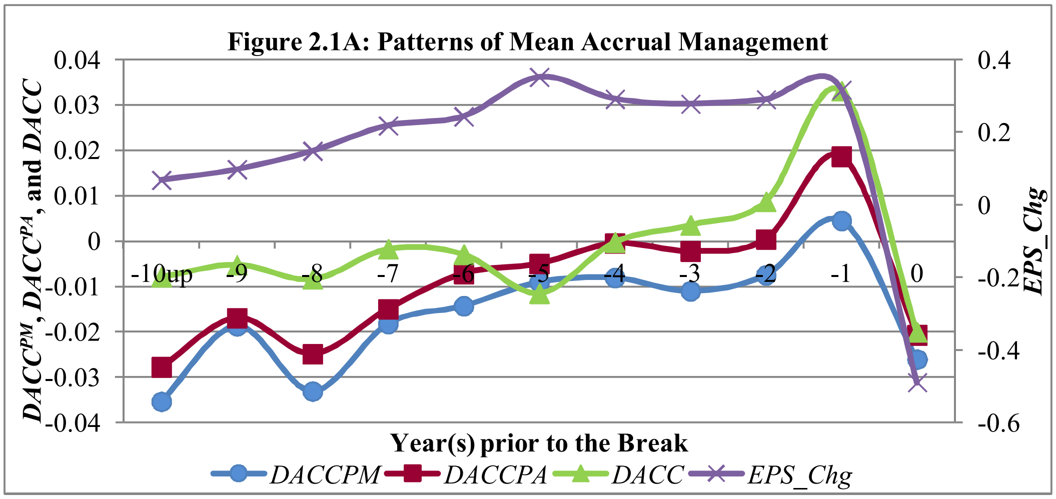
Panel E: Multivariate Results based on Subsample 2 (Five-year Earnings String Only)

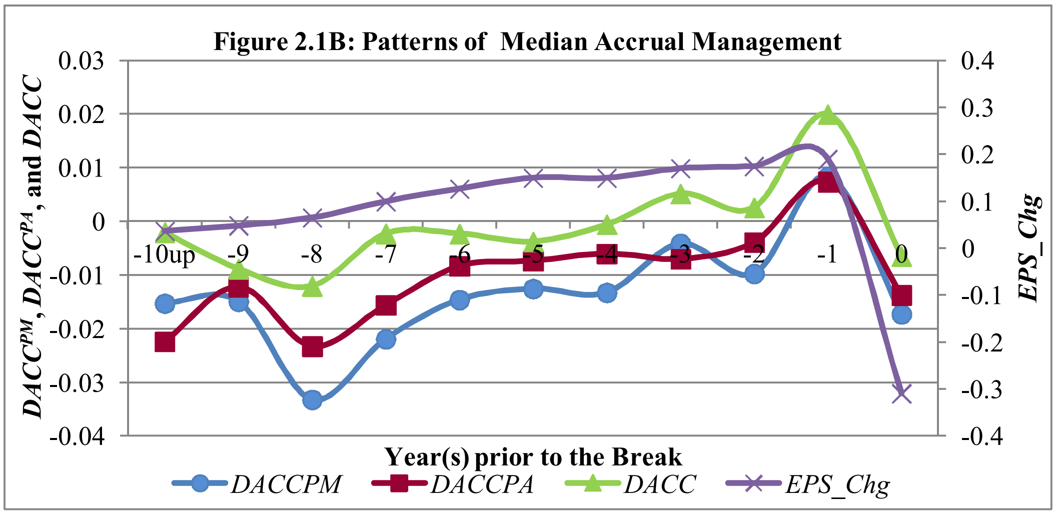
Y_{it}		(1). $DACC^{PM}$			(2). $DACC^{PA}$			(3). $DACC$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
MidES	?	0.0089	1.00	0.3203	0.0050	0.95	0.3419	0.0114	2.00	0.0465
−2Break	+	0.0184	2.06	0.0200	0.0149	2.52	0.0060	0.0208	3.29	0.0006
−1Break	+	0.0263	2.98	0.0015	0.0345	5.37	<.0001	0.0480	6.77	<.0001
Break	−	−0.0253	−2.66	0.0041	−0.0338	−4.73	<.0001	−0.0316	−3.91	<.0001
Adj. R^2		19.87%			29.61%			15.33%		
N		2,664 firm-year obs. (444 earnings strings)			2,664 firm-year obs. (444 earnings strings)			2,664 firm-year obs. (444 earnings strings)		

Note 1: $DACC^{PM}$, $DACC^{PA}$ and *DACC* represent performance-matched, performance-adjusted and performance-unadjusted discretionary accruals, respectively. $DACC^{PM}$ is defined as the difference between an ES sample firm's discretionary accruals and the discretionary accruals of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group. $DACC^{PA}$ is calculated as the difference between an ES sample firm's discretionary accruals and the median discretionary accruals for that firm's industry-*ROA* decile in the same year. *DACC* is defined as the residuals from the forward-looking modified-Jones model (summarized in Appendix 2-II).
Note 2: In **Panels A–B**, Early-ES, Mid-ES, −2Break, −1Break and Break Year are defined as the first two years of an earnings string, the period from the third year to the third last year of an earnings string, the second last year of an earnings string, the last year of an earnings string and the year immediately following the end of an earnings string, respectively.
Note 3: In **Panel B**, mean comparisons are based on *t*-tests and median comparisons are based on Wilcoxon tests. ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).
Note 4: In **Panels C–E**, *MidES*, *−2Break*, *−1Break* and *Break* are the test variables in Equation (2-5), representing the period from the third year of an earnings string to three years before the break, the second last year of an earnings string, the last year of an earnings string and the year immediately following the end of an earnings string, respectively. Results on control variables are not reported to conserve space. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 2-I** for variable definitions and measurements.

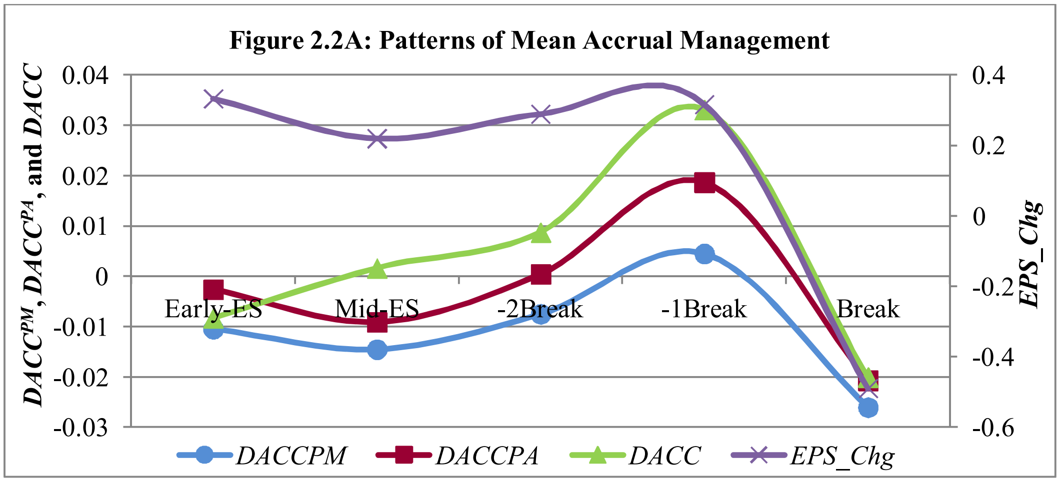
FIGURE 2.1: Patterns of Accrual Management by Year

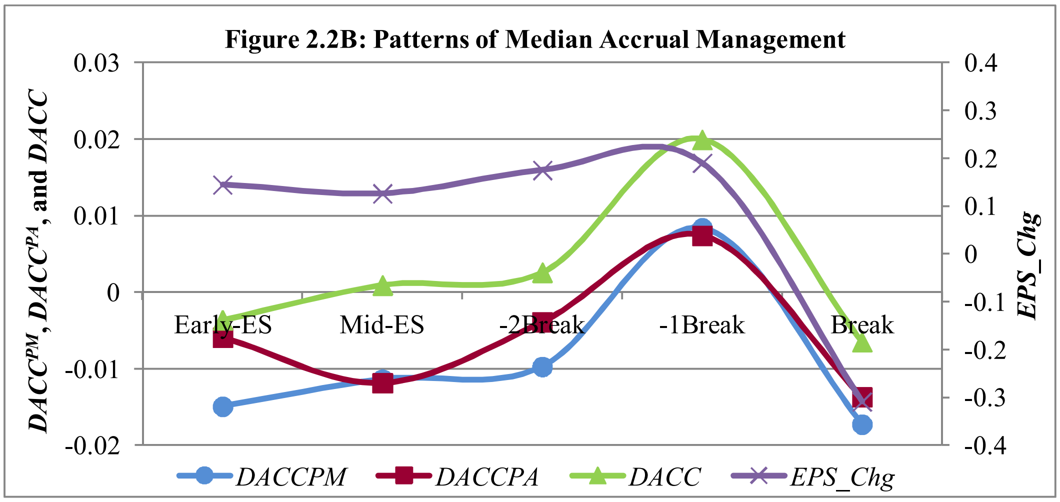




Note 1: These two graphs depict accrual management pattern by year along an earnings string. The sample period covers from 1989 to 2007 and the sample consists of 889 earnings strings (845 firms), or equivalently 6,385 firm-year observations including the break year. The X axis represents the number of year(s) that precede(s) the break of an earnings string, where 0 represents the break year and –t denotes t years before the break. Firm-year observations that fall in 10 to 18 years before the break are combined and labelled −10up, because there are only 64, amounting to less than 1 percent of the total sample. The Y axis represents the level of accrual management (proxied by $DACC^{PM}$, $DACC^{PA}$, and *DACC*) along with that of earnings changes (i.e., *EPS_Chg*).
Note 2: *EPS_Chg* represents changes in EPS, and is winsorized to −1.5 and +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991); $DACC^{PM}$ represents performance-matched discretionary accruals, defined as the difference in discretionary accruals between an ES firm and a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group; $DACC^{PA}$ represents performance-adjusted discretionary accruals, defined as the difference between an ES sample firm's discretionary accruals and the median discretionary accruals for that firm's industry-*ROA* decile in the same year; *DACC* represents performance-unadjusted discretionary accruals, defined as the residuals from the forward-looking modified-Jones model (summarized in Appendix 2-II).

FIGURE 2.2: Patterns of Accrual Management by Sub-period





Note 1: These two graphs depict accrual management pattern along five sub-periods of an earnings string. The sample period covers from 1989 to 2007 and the sample consists of 889 earnings strings (845 firms), or equivalently 6,385 firm-year observations including the break year. Each earnings string is divided into five sub-periods: Early-ES (the first two years of an earnings string), Mid-ES (the period from the third year of an earnings string to three years before the break), −2Break (two years before the break), −1Break (one year before the break) and Break (the year when an earnings string is broken). The X axis represents each of the five sub-periods of an earnings string and Y axis represents the level of accrual management (proxied by $DACC^{PM}$, $DACC^{PA}$, and *DACC*) along with that of change in earnings (i.e., *EPS_Chg*).

Note 2: *EPS_Chg* represents changes in EPS, and is winsorized to −1.5 and +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991); $DACC^{PM}$ represents performance-matched discretionary accruals, defined as the difference in discretionary accruals between an ES firm and a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group; $DACC^{PA}$ represents performance-adjusted discretionary accruals, defined as the difference between an ES sample firm's discretionary accruals and the median discretionary accruals for that firm's industry-*ROA* decile in the same year; *DACC* represents performance-unadjusted discretionary accruals, defined as the residuals from the forward-looking modified-Jones model (summarized in Appendix 2-II).

CHAPTER 3

Real Activity Management as a Means to Sustain Consecutive Earnings Increases

3.1 INTRODUCTION

In Chapter 2, I have examined the accrual pattern of firms reporting a "string" of consecutive earnings increases for at least five years (i.e., ES firms) and found that they undertake large income-increasing discretionary accruals in the final two years of an earnings string, followed by a significant reduction in discretionary accruals during the year when the string finally ends. The former finding is consistent with what is documented in the literature. Baik, Farber, Johnson and Yi (2008) for example report that firms with a pattern of non-negative earnings changes for at least eight consecutive quarters tend to increase discretionary accruals during the four quarters prior to the break to such pattern. Yong (2009) also finds that firms with at least three consecutive years of earnings increases are more likely to use income-increasing discretionary accruals in the two years before the earnings momentum is halted. While accrual management represents an important aspect of a firm's earnings management practice, it is not the only tool. Studies have shown that firms manage their real activities in order to achieve a desired earnings target (Cohen and Zarowin 2010; Gunny 2010; Cohen, Dey and

Lys 2008; Zang 2007; Roychowdhury 2006). According to a survey of more than 400 executives by Graham, Harvey and Rajgopal (2005), many managers prefer to take economic actions, rather than making within-GAAP accounting choices, to manage earnings even though doing so could adversely affect their companies in the long run. Thus, looking at accrual management alone offers a partial picture of the extent of earnings management by ES firms.

The purpose of Chapter 3 is to address the research questions of whether ES firms use real activity management to maintain a string of consecutive earnings increases and if the pattern of real activity management changes when an earnings string is finally broken. The sample spans over a 21-year period (1988–2008) and consists of 1,277 earnings strings from 1,190 ES firms.[28] Following Barth, Elliott and Finn (1999), I define each earnings string as including at least five-year consecutive increases in earnings per share. The majority of sample firms (i.e., 1,103) have exactly one earnings string during the sample period and the remaining 87 firms have two earnings strings each. In the main analysis, I use performance-matched abnormal discretionary expenses multiplied by -1 as a measure of real activity management (labelled $RDISX^{PM}$ hereinafter). A large value of $RDISX^{PM}$ implies smaller abnormal discretionary expenses, higher reported accounting earnings and hence a greater extent of real activity management. The research methodology calls for regressing $RDISX^{PM}$ on two test variables, *Break* and *LateES*, representing the break year and the late-ES period (i.e., the final two years of an earnings string), respectively. The regression also

[28] They correspond to 9,164 firm-year observations, including the break year.

includes a set of control variables modeled by Cohen and Zarowin (2010) and Roychowdhury (2006).

Results indicate that both the mean and the median values of $RDISX^{PM}$ in the late-ES period exceed the corresponding values in the early-ES period. While $RDISX^{PM}$ for the break year is on average larger than mean $RDISX^{PM}$ in the early-ES period, it is statistically identical to that in the late-ES period. After controlling for the potential effects of covariates, the coefficient estimate on the *LateES* variable is positive and significant, while the corresponding estimate on the *Break* variable is insignificantly different from zero. Results for the *LateES* variable continue to hold when the sample is redefined to include 1,103 ES firms with only a single earnings string (labelled Subsample 1 hereinafter) or 625 ES firms whose earnings strings last exactly five years (labelled Subsample 2 hereinafter). These results remain robust to alternative proxies for real activity management, i.e., performance-adjusted and performance-unadjusted abnormal discretionary expenses multiplied by -1 (labelled $RDISX^{PA}$ and *RDISX* hereinafter). By comparison, the coefficient estimate on the *Break* variable is either positive and significant or statistically insignificant. Consistent with the accrual results reported in Chapter 2, ES firms are found to undertake income-increasing real activity management by substantially reducing their discretionary expenses during the late-ES period. However unlike the earlier accrual findings ES firms do not engage in income-decreasing real activity management by raising discretionary expenses in the break year.

To gain further insight into the progression of real activity management within an earnings string, I modify the research design in two ways: First, replacing the *LateES* variable in the main regression model with two new test variables, $-2Break$ and $-1Break$, defined as the second last and the last year of an earnings string, respectively. Second, reclassifying the early-ES period into the first two years and middle years of an earnings string, where the latter is reflected in a new test variable, *MidES*. For all three proxies for real activity management (i.e., $RDISX^{PM}$, $RDISX^{PA}$ and *RDISX*) and sample choices (i.e., original sample, Subsample 1 and Subsample 2), the coefficient estimate on $-1Break$ is consistently more positive with larger *t*-statistics than that on $-2Break$. The latter test variable in turn is at least as large as that on *MidES*, whereas the coefficient estimate on the *Break* variable is either positive and significant or insignificantly different from zero. These results mirror largely the corresponding patterns of accrual management reported in Chapter 2. In particular, ES firms start to manage their real activities mid-way through the earnings string and significantly increase the intensity towards the end of an earnings string. As in the main analysis, I do not find any evidence of reduction in real activity management following the break to an earnings string.

To the best of my knowledge, the extant literature has not considered the possibility of using real activity management to sustain earnings momentum. Chapter 3 fills the void by providing a comprehensive analysis of real activity management not just within an earnings string, but also during the break year.

Findings that ES firms rely on both accrual and real activity management in the year right before the break to sustain an earnings string add to the debate about whether these two earnings management tools are complements or substitutes. On the other hand, evidence that patterns of accrual and real activity management differ during the break year highlight fundamental differences in these two earnings management tools.

The remainder of Chapter 3 is organized as follows. Section 3.2 provides a literature review and develops the hypotheses. Section 3.3 describes data and sample, followed by research design in Section 3.4. Section 3.5 reports results from the main analysis and the robustness checks. Section 3.6 presents results based on further analysis. Section 3.7 concludes Chapter 3.

3.2 LITERATURE REVIEW

Since a survey study by Graham et al. (2005), much attention has been devoted to seeking empirical evidence on the use of real activity management as a tool to achieve earnings targets and on the implications of its use for earnings management. Roychowdhury (2006) for example shows that firms manage earnings upward to avoid losses by reducing discretionary expenses and managing other real activities. Gunny (2010) also finds that real earnings manipulations are associated with firms just meeting two earnings benchmarks (zero and last year's earnings) and that using real activities to influence the accounting system is not opportunistic, but rather it signals better future performance.

Several studies focus on the tradeoffs between accrual and real activity management. For a broad sample of firms over a 12-year (1992–2003) period, Zang (2007) concludes that managers determine real manipulations before accrual manipulations, implying that these two tools are substitutes. Consistent with Zang (2007), Cohen et al. (2008) show that accrual-based earnings management increased steadily from 1987 until the passage of the Sarbanes-Oxley Act in 2002 and the trend is reversed thereafter until the end of their sample period (2005), whereas the converse is true for real activity management. Finally, Cohen and Zarowin (2010) find evidence of significant accrual as well as real activity management around 1,511 seasoned equity offerings made between 1987 and 2006.

One of the factors affecting the choice of accrual vs. real activity management is costs. While accrual management may be easily implemented, it can attract the attention of auditors and regulators. The public scrutiny can be particularly intense for firms that report consecutive earnings increases over many years. By comparison, real activity management cannot be easily detected as it represents departures from the unobservable optimal internal business decisions, giving rise to an incentive by managers to engage in such practice. Countering this motive is the knowledge that suboptimal decisions resulting from real activity management can have an adverse effect on firm value in the long run. Since the break to an earnings string can engender negative market reaction and lower firm value, to the extent that ES firms manage real activities I expect them to do so more intensively towards the end of an earnings string. The above discussion leads to the first hypothesis for Chapter 3 (in alternate form):

> **HYPOTHESIS 3A**. *Ceteris paribus*, ES firms are expected to engage in more aggressive real activity management near the end of an earnings string, compared to the early part of an earnings string.

The prediction for the break year however is less clear-cut. While large discretionary expenses are likely to benefit the firm in the future, they lower income in the short run. Already faced with a declining fortune that halted the earnings string in the first place, ES firms may be reluctant to reduce real activity management by considerably increasing spending on real activities during the break year. On the other hand, given that break to an earnings string is inevitable ES firms may proceed to fix up, at least partially, the basic level of operations neglected due to unusually low spending on discretionary expenses near the end of an earnings string. As a result, real activities in the break year may be at or near the normal level. On balance, I expect little difference in the level of discretionary expenses in the break year versus that in the early-ES period. The above discussion leads to the second hypothesis for Chapter 3 (in null form):

> **HYPOTHESIS 3B**. *Ceteris paribus*, ES firms are expected to engage in a similar level of real activity management during the break year, compared to the early part of an earnings string.

3.3 DATA AND SAMPLE

The initial sample consists of 104,726 firm-year observations between 1988 and 2008 from COMPUSTAT Fundamental Annual database.[29] Following the convention of Barth et al. (1999), ES firms are defined as those with at least five-year consecutive increases in earnings per share (EPS).[30] Among the 1,691 strings (or 10,555 firm-year observations) that fit this definition, I eliminate 238 strings (or 1,603 firm-year observations) that contain the final year of sample period (i.e., 2008) and 176 strings (or 1,065 firm-year observations) that do not have accounting information at the break year, as the analysis requires a clear identification of the break to an earnings string. Applying these filters yields 1,277 earnings strings (or 7,887 firm-year observations) that are part of an earnings string. Adding another 1,277 firm-year observations representing the break year forms the final sample of 9,164 firm-year observations (labelled ES sample hereinafter). Panel A of Table 3.1 summarizes the above sample selection procedure.

Panels B-D of Table 3.1 present the descriptive statistics for the ES sample. There are a total of 1,277 earnings strings from 1,190 distinct firms and most earnings strings are the first earnings string with few representing the second

[29] The sample period starts in year 1988, when the cash flow statement became mandatory. I also exclude firm-year observations from Financial (SIC 6000–6999) and Regulated industries (4400–5000) from the initial sample. Although the initial data are collected from the same Compustat database (between 1987 and 2008) as those used in Chapter 2, the final sample period and sample size differ from those in Chapter 2 due to different data requirements for model variables: Chapter 2 requires two-year lag data and one-year lead data (for instance, total assets in 1987 and sales in 2008 are required to calculate discretionary accruals between 1989 and 2007), whereas only one-year lag data is required to calculate model variables in Chapter 3.

[30] The split-adjusted annual EPS (excluding extraordinary items) is used as a proxy for reported annual earnings.

string, i.e., 1,190 vs. 87 (see Panel B). The ES sample is distributed across 42 two-digit SIC industries in a pattern largely similar to that for the overall COMPUSTAT population (see Panel C). Finally, the vast majority of ES sample has earnings strings that last 10 years or less (97.03 percent) and the maximum length of earnings string is 20 years (see Panel D).

[Insert Table 3.1 about Here]

3.4 RESEARCH DESIGN

The following regression model is used to test the predictions of Hypotheses 3A and 3B:[31]

$$\begin{aligned} Y_{it} = {} & \beta_0 + \beta_1 \bullet LateES_{it} + \beta_2 \bullet Break_{it} \\ & + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet NewIssue_{it} \qquad (3\text{-}1) \\ & + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it} \end{aligned}$$

where subscripts i, t and j represent sample firm i in year t and industry j. Definitions and measurements for all the variables in Equation (3-1) are discussed below and summarized in Appendix 3-I.

[Insert Appendix 3-I about Here]

<u>Dependent Variable</u>

The dependent variable in Equation (3-1), Y_{it}, represents the performance-matched abnormal discretionary expenses multiplied by -1, calculated using the following

[31] All continuous control variables in Equation (3-1) are winsorized at the top and bottom 1 percent to mitigate the effects of outliers. In reporting *t*-values, I use robust standard errors to correct for potential problems associated with heteroskedasticity and firm clustering (Petersen 2009). The main results are similar when I use the two-way clustered (firm and year) standard errors.

three-step procedure. First, I estimate abnormal discretionary expenses using the following Roychowdhury's (2006) model:[32]

$$\frac{DIS_{it}}{TA_{it-1}} = \alpha_0 + \alpha_1 \frac{1}{TA_{it-1}} + \alpha_2 \frac{S_{it-1}}{TA_{it-1}} + \varepsilon_{i.t} \qquad (3\text{-}2)$$

where DIS_{it} denotes discretionary expenses; TA_{it-1} is lagged total assets; S_{it-1} denotes lagged sale. Equation (3-2) is estimated cross-sectionally for every industry (two-digit SIC code) and by year.[33] The residuals from Equation (3-2) represent abnormal discretionary expenses for sample firm *i* in year *t* (i.e., $DISX_{it}$). Appendix 3-II presents the mean values of estimated coefficients across all industry-years, along with the *t*-statistics calculated using the standard error of the mean across industry-years. All estimated coefficients have the same signs as those in Roychowdhury (2006) and are significant at the 1 percent level.

[Insert Appendix 3-II about Here]

Second, I match every observation in the ES sample with an observation from the non-ES sample that has the closest return on assets (*ROA*) within the same industry-year group.[34] The performance-matched abnormal discretionary expenses for ES firm *i* are given by the abnormal discretionary expenses of ES

[32] I do not consider two other measures of real activity management examined by Roychowdhury (2006), i.e., abnormal cash flow from operations and abnormal production costs, because the income effect of abnormal cash flow from operation is mixed and abnormal production costs are not available for non-manufacturing firms.
[33] The estimation is on the full sample of 104,726 firm-year observations over the 21-year (1988–2008) sample period. All the model variables are winsorized at the top and bottom 1 percent of their respective distributions.
[34] In the event of ties, I choose an observation with the closest firm size, expressed as natural logarithm of market value of equity, as the match.

firm i minus the corresponding expenses of its matched non-ES firm.[35] Third, I multiply the resulting measure by −1 (i.e., $RDISX^{PM}_{it}$) so that a large $RDISX^{PM}_{it}$ implies a greater extent of real activity management (labelled RM hereinafter) which raises accounting earnings.

As robustness checks, I also consider two alternative proxies for RM estimated from the same model, i.e., the performance-adjusted and performance-unadjusted abnormal discretionary expenses multiplied by −1. The former proxy (i.e., $RDISX^{PA}_{it}$) is calculated by replacing Step 2 of the above three-step procedure with the following: the abnormal discretionary expenses of every observation in the ES sample minus the median unadjusted abnormal discretionary expenses for that firm's industry-*ROA* decile in the same year (Cahan and Zhang 2006). The latter proxy (i.e., $RDISX_{it}$) is defined as −1 times the residuals from Equation (3-2).

Test Variables

Equation (3-1) includes two test variables: $LateES_{it}$, set equal to one if a firm-year observation falls in the late-ES period (i.e., final two years of an earnings string) and zero otherwise; and $Break_{it}$, set equal to one if a firm-year observation falls in the break year and zero otherwise. The base group is the early-ES period (i.e., the remaining years of an earnings string) whose length ranges from three to 18 years.

[35] This matching procedure is intended to mitigate potential measurement errors due to significantly stronger performance of ES sample than the non-ES sample (Kothari, Leone and Wasley 2005).

The mean and median values of all three RM proxies ($RDISX^{PM}_{it}$, $RDISX^{PA}_{it}$ and $RDISX_{it}$) and changes in EPS[36] for each year within the earnings string and the break year are depicted in Figures 3.1A and 3.1B. Since only 92 firm-year observations, or less than 1 percent of the ES sample, come from 10 to 20 years before the break, I combine these observations into one sub-period, labelled −10up, to ease the presentation. For the mean values of each RM proxy, there is no discernible pattern until three years before the break (labelled −3), when they start a steep climb to reach their peak level in the year immediately preceding the break (labelled −1). While these mean values go down in the break year, they remain at a level higher than that during much of the earnings string except for year −1. On the other hand, the mean values of changes in EPS reach a peak level five years and one year before the break, and then drop sharply in the break year. The last year of an earnings string would appear to be sustained through real activity management. The median values exhibit largely similar patterns.

[Insert Figures 3.1A and 3.1B about Here]

Control Variables

Equation (3-1) includes four control variables known to affect a firm's abnormal discretionary expenses (Cohen and Zarowin 2010; Roychowdhury 2006):[37] (1).

[36] Changes in EPS are winsorized to −1.5 and +1.5 (see Barth, Hodder and Stubben 2008; Kothari, Laguerre and Leone 2002; and Easton and Harris 1991).

[37] Note that Roychowdhury (2006) uses the existence of debt to control for the financial structure of a firm. To be consistent with Chapter 2, I employ the leverage ratio instead. Unlike Roychowdhury (2006), Equation (3-1) does not include *ROA* because firm performance is controlled through the performance-matching technique.

Firm size ($Size_{it-1}$), defined as natural logarithm of opening market value of equity; (2). Book-to-market ratio (BTM_{it-1}), defined as book value over market value of equity at the beginning of the year; (3). Debt-to-asset ratio ($Leverage_{it-1}$), defined as total debts at the beginning of the fiscal year deflated by opening total assets; (4). New equity issues ($NewIssue_{it}$), set equal to one if a firm raises capital in the current period and zero otherwise. Finally, Equation (3-1) also includes *IndustryDummy* and *YearDummy* variables to control for the potential industry and year effects. To ease exposition, subscripts *i* and *t* are suppressed in the subsequent discussion.

Model Predictions

A positive and significant coefficient estimate on the test variable *LateES* is consistent with the prediction that ES firms engage in more aggressive real activity management towards the end of an earnings string than the early-ES period (Hypothesis 3A). An insignificant coefficient estimate on the test variable *Break* implies that ES firms maintain a similar level of real activity management during the break year, compared to the early part of an earnings string (Hypothesis 3B).

3.5 MAIN ANALYSIS

3.5.1 Descriptive Statistics

Table 3.2 presents the distribution of model variables in Equation (3-1) over the ES sample of 1,190 firms, or equivalently 9,164 firm-year observations including the break year. The mean (median) values of $RDISX^{PM}$, $RDISX^{PA}$ and *RDISX* are −0.0053 (−0.0046), −0.0420 (−0.0050), and 0.0002 (0.0451), respectively. The mean value of *Size* is very close to its median (5.6350 vs. 5.6424), suggesting that this variable is not skewed in either direction. On average, ES firms have larger market value than book value (mean *BTM* = 0.4394) and less debts than assets (mean *Leverage* = 0.2033). A significant number of ES firms issue equity capital in the current period (*NewIssue* = 0.8317).

[Insert Table 3.2 about Here]

Table 3.3 presents the correlation matrix among pairs of model variables, other than *Industry* and *Year* dummies, in Equation (3-1) for the ES sample. The pair-wise Pearson (Spearman) correlations appear above (below) the diagonal. The three RM proxies are highly correlated, with Pearson correlation coefficients between $RDISX^{PM}$ and $RDISX^{PA}$, $RDISX^{PM}$ and *RDISX*, and $RDISX^{PA}$ and *RDISX* of 0.6176, 0.5815, and 0.9028, respectively, all significant at the 1 percent level. ES firms that have high growth potential or issue new equity tend to undertake less real activity management. The Pearson correlation coefficients between *BTM* (*NewIssue*) and $RDISX^{PM}$, $RDISX^{PA}$ and *RDISX* are 0.0342 (−0.0344), 0.0844 (−0.0568), and 0.1627 (−0.0447), respectively, all significant at the 1 percent level. Results are qualitatively similar for the Spearman correlations. The largest variance inflation factor (condition index) is 1.1619 (1.5419), implying that multicollinearity likely is not a major concern.

[Insert Table 3.3 about Here]

3.5.2 Results from Univariate Analysis

Column 3 (4) of Panel A of Table 3.4 presents the expected (observed) number of earnings strings whose peak level of $RDISX^{PM}$ occurs in the three sub-periods associated with an earnings string: the early-ES period, the late-ES periods and the break year. While the observed number of earnings strings that peak in the late-ES period is much larger than expected (408 vs. 356), the converse is true for the number of earnings strings that peak in the early-ES period (693 vs. 743). Finally, both numbers are statistically similar for earnings string with peak $RDISX^{PM}$ in the break year (176 vs. 178). Overall, a *Chi-square* test indicates that the patterns of observed and expected numbers of peak $RDISX^{PM}$ in the three sub-periods are significantly different at the 1 percent level.

Rows 1–3 of Panel B report the mean and median values of $RDISX^{PM}$ calculated over 5,333, 2,554 and 1,277 firm-year observations that fall in the early-ES period, the late-ES period and the break year, respectively. The difference in mean (median) $RDISX^{PM}$ between the late and the early-ES period is 0.0266 (0.0255), significant at the 10 (1) percent level (see Row 4). But, both the mean and the median values from the Late-ES period are statistically similar to those in the break year (see Row 6). On average, $RDISX^{PM}$ from the break year weakly exceeds that from the early-ES period (0.0140 vs. −0.0170; see Rows 3 and 1).

[Insert Table 3.4 about Here]

3.5.3 Results from Regression Analysis

Table 3.5 presents the regression results estimated based on Equation (3-1) over the original ES sample of 1,190 firms, or equivalently 9,164 firm-year observations. After controlling for the potential effects of covariates, the coefficient estimate on the *LateES* variable is positive and significant at the 5 percent level (0.0295, *t*-statistics = 1.85). Compared to the early-ES period, firms undertake more aggressive real activity management in the final two years of an earnings string, consistent with the prediction of Hypothesis 3A. The coefficient estimate on the *Break* variable is insignificant (0.0251, *t*-statistics = 1.27), implying that there is no difference in the extent of real activity management between the break year and the early-ES period as predicted in Hypothesis 3B.

[Insert Table 3.5 about Here]

ES firms differ in terms of the length of earnings string (five to 20 years) and their history (one to two earnings strings). To ensure that variations in these two dimensions do not affect the results, I create two subsamples consisting of 1,103 ES firms with only one earnings string (Subsample 1) and 625 ES firms whose earnings strings last exactly five years (Subsample 2), respectively. Subsample 1 (2) has 7,920 (3,876) firm-year observations, including the break year.[38] Results for Subsamples 1 and 2 are reported in Columns 1 and 2 of Table 3.6, respectively. For both subsamples the coefficient estimates on the *LateES* variable are positive and significant (0.0342, *t*-statistics = 1.91; 0.0558, *t*-statistics

[38] Subsample 1 is smaller than the original ES sample by 1,244 firm-year observations, of which 637 relate to the first earnings string and 607 to the second string. Subsample 2 consists of 646 earnings strings, where 21 are the second string for a particular firm. So, the total number of firms are 646 − 21 = 625 firms. The corresponding firm-year observations for Subsample 2 are 3,876, with 3,230 within an earnings string and 646 from the break year (646 x 5 + 646 = 3,876).

= 2.15), lending further support for the prediction of Hypothesis 3A. On the other hand, the *Break* variable is either insignificantly different from zero in Subsample 1 (0.0244, *t*-statistics = 1.08) or significantly positive in Subsample 2 (0.0821, *t*-statistics = 2.38), offering mixed support for Hypothesis 3B.

[Insert Table 3.6 about Here]

Overall, results indicate that the pattern of real activity management by ES firms within an earnings string is similar to that of accrual management. In particular, ES firms increase the intensity of real activity management towards the end of an earnings string in an attempt to sustain the string. But unlike accrual management, ES firms do not significantly lower the extent of real activity management in the break year over that prevailing at the beginning of an earnings string. These results continue to hold when I exclude earnings strings of length greater than five years or ES firms with multiple earnings strings from the sample.

3.5.4 Results from Sensitivity Analysis

Table 3.7 presents results based on two alternative RM proxies: performance-adjusted and performance-unadjusted abnormal discretionary expenses multiplied by −1 ($RDISX^{PA}$ and *RDISX*). Univariate (multivariate) results for the original ES sample appear in Panels A–B (C). The corresponding multivariate results for Subsamples 1 and 2 appear in Panels D–E, respectively.

As is evident in Column 4 (5) of Panel A, the observed number of earnings strings whose peak level of $RDISX^{PA}$ (*RDISX*) occurs in the late-ES period exceeds the expected number, i.e., 398 vs. 356 (370 vs. 356). The converse is true for the number of earnings strings that peak in the early-ES period, i.e., 663 vs.

743 (524 vs. 743). Both patterns are consistent with those documented previously using $RDISX^{PM}$ as a proxy for real activity management. However, the observed number of earnings strings that have peak $RDISX^{PA}$ (*RDISX*) in the break year now exceeds the expected number, i.e., 216 vs. 178 (383 vs. 178). The mean and median values of $RDISX^{PA}$ (*RDISX*) from the late-ES period again exceed those from the early-ES period, with differences of 0.0241 and 0.0147 (0.0430 and 0.0289), respectively, significant at the 5 percent level or better (see Row 4, Panel B). Evidence is nonetheless mixed when comparisons are made between the break year and the early-ES period. While differences are insignificant based on $RDISX^{PA}$, they are positive and significant using *RDISX* (see Row 5, Panel B).

Regardless of the sample choice (original ES sample, Subsample 1 and Subsample 2), for both RM proxies the test variable *LateES* is always significantly positive and the *Break* variable is either insignificant or significantly positive. Take the $RDISX^{PA}$ regression based on the original ES sample for example, I find that the coefficient estimates (*t*-statistics) on *LateES* and *Break* are 0.0408 and 0.0258 (3.52 and 1.65), significant at the 1 and 5 percent levels, respectively (see Column 1, Panel C). The corresponding values for the *RDISX* regression are 0.0549 and 0.0554 (4.64 and 3.56), respectively, both significant at the 1 percent level (see Column 2, Panel C). In short, the main results are invariant to the choice of proxies for RM.

[Insert Table 3.7 about Here]

3.6 FURTHER ANALYSIS

To check for the progression in the intensity of real activity management within an earnings string, I modify the definition of late-ES period to allow each year within this period to enter the model separately and then partition the early-ES period into two sub-periods, i.e., the first two years and the remaining years of the early-ES period. The resulting model is summarized below:

$$Y_{it} = \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet -2Break_{it} + \beta_3 \bullet -1Break_{it} + \beta_4 \bullet Break_{it}$$
$$+ \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet NewIssue_{it} \quad (3\text{-}3)$$
$$+ \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$$

where *MidES* is set equal to one if a firm-year observation falls in the period from the third year of an earnings string to three years before the break and zero otherwise;[39] $-2Break$ ($-1Break$) is set equal to one if a firm-year observation falls in the second last (the last) year of an earnings string. The first two years of an earnings string (i.e., early-ES period) is the reference group. All the other variables in Equation (3-3) are as defined before.

Figures 3.2A and 3.2B depict the mean and median values for each of the three RM proxies ($RDISX^{PM}$, $RDISX^{PA}$ and *RDISX*) along with changes in EPS in the following five time periods: early-ES period, mid-ES period, two years before the break, one year before the break and the break year, which are labelled Early-ES, Mid-ES, −2Break, −1 Break and Break, respectively. For all three RM proxies, the mean values increase gradually from early-ES period to −2Break and

[39] The number of years included in the mid-ES period varies from one year for a five-year earnings string to 16 years for a 20-year earnings string in the original ES sample and Subsample 1.

then rise sharply to reach their peak in −1Break. In each case, the upward trend is reversed in the break year, though the mean value remains at a level at least as high as that in −2Break.[40] On the other hand, the mean values of changes in EPS stay at positive level during pre-break periods and then drop sharply in the break year.

[Insert Figures 3.2A and 3.2B about Here]

Panels A–B (C) of Table 3.8 present the univariate (multivariate) results based on the original ES sample and Panels D–E report the corresponding multivariate results for Subsample 1 and Subsample 2, respectively.

The observed number of earnings strings that have peak $RDISX^{PM}$ in −1Break (−2Break) exceeds the expected number, i.e., 218 vs. 178 (190 vs. 178). But, the observed number of earnings strings that have peak $RDISX^{PM}$ in the mid- or early-ES period is smaller than expected, i.e., 349 vs. 387 and 344 vs. 356 (see Column 4, Panel A). For the earnings strings that peak in the break year, there is little difference between the observed and the expected numbers (176 vs. 178). These patterns largely extend to the other two RM proxies ($RDISX^{PA}$ and *RDISX*), except that the actual numbers of earnings strings that have peak $RDISX^{PA}$ (or *RDISX*) in the break year now exceed the expected number, i.e., 216 (or 383) vs. 178 (see Columns 5–6, Panel A).

Univariate comparisons of mean and median values of all three RM proxies indicate that these values are generally larger in −1Break, compared to

[40] The median values display a similar pattern except that the median *RDISX* in the break year remains at a similar level of that in one year before the break.

Early-ES or Mid-ES, with differences significant at the 5 percent level or better (see Rows 8–9, Panel B). While both mean and median values in −2Break also exceed the corresponding values in Early-ES and Mid-ES, the differences are nonetheless mostly insignificantly different from zero (see Rows 6–7, Panel B). Finally, differences in mean and median values of each RM proxy between the break year and Early-ES or Mid-ES are either insignificant or positive and significant (see Rows 10–11, Panel B).

I now turn to multivariate results estimated based on Equation (3-3). Among nine combinations of sample choice (original ES sample, Subsample 1 and Subsample 2) and RM proxy ($RDISX^{PM}$, $RDISX^{PA}$ and *RDISX*), the coefficient estimates on the test variable *−1Break* are almost always positive and significant at the 5 percent level or better. By comparison, the coefficient estimates on *MidES* and *−2Break* are positive and significant at the conventional levels in three to four cases. Of particular interest is the magnitude of coefficient estimates and *t*-statistics across test variables within the same set of regression. Results indicate that the coefficient estimates on *−1Break* are consistently larger with stronger *t*-statistics than those on *− 2Break*. Likewise, *− 2Break* in general has larger coefficients and more positive *t*-statistics than *MidES*. While the coefficient estimates on both *−1Break* and *Break* are positive, *−1Break* nonetheless has a larger coefficient than *Break* in eight out of nine regressions.

[Insert Table 3.8 about Here]

Taken together, these results are consistent with the patterns depicted in Figures 3.2A and 3.2B. In particular, ES firms increase the intensity of real activity management gradually until two years before the break and then raise it sharply from -2Break to -1Break. The trend reverses somewhat in the year when the earnings string is finally broken, but the reduction in real activity management is relatively modest such that the level in the break year is never below that observed at the beginning of an earnings string.

3.7 CONCLUSION

In Chapter 3, I have examined the pattern of real activity management undertaken by ES firms - firms with at least five consecutive years' of earnings increases - over a 21-year (1988–2008) sample period. Results indicate that ES firms engage in aggressive real activity management by spending significantly lower level of discretionary expenses in the final two years of an earnings string, compared to the remaining years within the string. However, there is no evidence of a complete reversal to the pattern of real activity management when an earnings string finally comes to an end. Further analysis indicates that the extent of real activity management rises gradually throughout an earnings string before reaching its peak in the year right before the break and that during the break year ES firms continue to manage their real activities at a level that is at least on par with the first two years of an earnings string. Both sets of analysis are robust to alternative proxies for real activity management and different sample choices.

Results from Chapter 3 enhance one's understanding about how earnings momentum is sustained in practice and contribute to the literature looking into the factors that affect firms' choice of one method of earnings management over the other. Findings that the extent of real activity management does not significantly decline in the break year point to fundamental differences in accrual and real activity management as a tool to manage reported earnings, which will be further explored in Chapter 4 by examining the market reaction to these two earnings management techniques.

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Appendix 3-I
Definitions & Measurements of Variables in Chapter 3

Variables	**Definitions & Measurements**
Main Analysis (See Equation (3-1))	
Dependent Variable:	
$RDISX^{PM}$	Performance-matched abnormal discretionary expenses multiplied by −1; defined as the difference between abnormal discretionary expenses of an ES firm *i* and abnormal discretionary expenses of a non-ES firm that has the closest *ROA* (return on assets, defined as net income deflated by opening total assets) in the same two-digit SIC industry-year group, and then multiplied by −1.
Test Variables:	
LateES	= 1, if a firm-year observation falls in the last two years of an earnings string; = 0 otherwise.
Break	= 1, if a firm-year observation falls in the break year of an earnings string; = 0 otherwise.
Control Variables:	
Size	Natural logarithm of market value of equity at the beginning of the fiscal year.
BTM	Book-to-market ratio at the beginning of the fiscal year.
Leverage	Total debts at the beginning of the fiscal year deflated by opening total assets.
NewIssue	= 1, if a firm issues new equity; = 0 otherwise.
IndustryDummy	42 dummies for two-digit SIC industry group.
YearDummy	21 dummies for fiscal year.

(The appendix is continued on the next page.)

Appendix 3-I (Continued)

Variables	Definitions & Measurements
Abnormal Discretionary Expense Estimation Model (See Equation (3-2) and Appendix 3-II)	
DIS	Discretionary expenses; the sum of advertising, R&D (research & development), and SG&A expenses (selling, general & administration expenses); at least one of these three expenses is available, other remaining expenses are set to zero if they are missing.
TA	Total assets.
S	Sales (net).
DISX	Abnormal discretionary expenses; residuals estimated from the normal discretionary expense regression based on Roychowdhury (2006).
Sensitivity Analysis	
$RDISX^{PA}$	Performance-adjusted abnormal discretionary expenses multiplied by −1; defined as the difference between a firm *i*'s abnormal discretionary expenses and the median abnormal discretionary expenses of the *ROA* decile in the same two-digit SIC industry-year group, and then multiplied by −1.
RDISX	Abnormal discretionary expenses multiplied by −1.
Further Analysis (See Equation (3-3))	
MidES	= 1, if a firm-year observation falls in the period from the third year of an earnings string to three years before the break of an earnings string; = 0 otherwise.
−2Break	= 1, if a firm-year observation falls in two years before the break of an earnings string; = 0 otherwise.
−1Break	= 1, if a firm-year observation falls in one year before the break of an earnings string; = 0 otherwise.

Appendix 3-II
Estimation of Abnormal Discretionary Expenses

To calculate abnormal discretionary expenses, I follow Roychowdhury (2006) and estimate the following regression model cross-sectionally for every two-digit SIC industry-year group with at least 20 observations over 1988–2008:

$$\frac{DIS_{it}}{TA_{it-1}} = \alpha_0 + \alpha_1 \frac{1}{TA_{it-1}} + \alpha_2 \frac{S_{it-1}}{TA_{it-1}} + \varepsilon_{it}$$

All variables are winsorized at the top and bottom 1 percent of their respective distributions. The residuals represent abnormal discretionary expenses (denoted as *DISX*).

A summary of the mean value of each estimated coefficient across 821 industry-years, along with *t*-statistics calculated using the standard error of the mean across 821 industry-years, is presented below. The adjusted R^2 is the mean adjusted R^2 over 821 industry-years.

	Mean Value of Estimated Coefficient (*t*-statistics)
Intercept	0.1652 (22.61)***
$\frac{1}{TA_{it-1}}$	1.4923 (17.20)***
$\frac{S_{it-1}}{TA_{it-1}}$	0.1255 (24.14)***
Mean Adjusted R^2 (in %) = 40.18%	

Note 1: ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).

Please refer to **Appendix 3-I** for variable definitions and measurements.

TABLE 3.1
Sample and Data

Panel A: Sample Selection Process

	Number of Earnings Strings	Number of Observations
Total number of earnings strings (ES)[1]/observations collected from COMPUSTAT Fundamental Annual Database (1988–2008)	1,691	10,555
Less: Final year of earnings strings fell in 2008	(238)	(1,603)
Less: Missing data in the break year	(176)	(1,065)
Number of earnings strings/observations with clearly identifiable break year (excluding the break year)	1,277	7,887
Number of observations in the break year[2]		1,277
The ES sample (1988–2008)	1,277	9,164

Note 1: An earnings string (ES) is defined as a string of increasing EPS for at least five years.
Note 2: While the break year is not part of an earning string, it is included in the original ES sample to test the prediction of Hypothesis 3B.

Panel B: Composition of the ES Sample (1988–2008)

	N	%
Number of first strings	1,190	93.19%
Number of second strings	87	6.81%
Total number of earnings strings	1,277	100.00%
Number of distinct firms with one earnings string	1,103	92.69%
Number of distinct firms with two earnings strings	87	7.31%
Total number of distinct firms with an ES	1,190	100.00%

(The table is continued on the next page.)

TABLE 3.1 (Continued)

Panel C: Industrial Distribution of the ES Sample (1988–2008)

	ES Sample				**COMPUSTAT Population**[1]	
	(# of Firms)		**(# of Obs)**		**(# of Obs)**	
Industry (two-digit SIC)	**N**	**%**	**N**	**%**	**N**	**%**
Mining & Construction (10–12,14–19)	27	2.27%	212	2.31%	5,185	4.95%
Oil & Gas (13,29)	44	3.70%	284	3.10%	7,347	7.02%
Food products (20–21)	47	3.95%	398	4.34%	2,852	2.72%
Textiles (22–27)	75	6.30%	610	6.66%	6,290	6.01%
Chemical products (28)	122	10.25%	989	10.79%	10,817	10.33%
Manufacturing (30–34)	78	6.55%	591	6.45%	6,446	6.15%
Computer equipment (35)	87	7.31%	685	7.47%	7,802	7.45%
Electronic equipment (36)	116	9.75%	864	9.43%	10,090	9.63%
Transportation (37,39–43)	51	4.29%	383	4.18%	4,263	4.07%
Scientific instruments (38)	109	9.16%	812	8.86%	8,029	7.67%
Retail (50–59)	196	16.47%	1,601	17.47%	12,635	12.06%
Services (70–89)	229	19.24%	1,674	18.27%	20,984	20.04%
Other (90–99)	9	0.76%	61	0.67%	1,986	1.90%
Total	1,190	100.00%	9,164	100.00%	104,726	100.00%

Note 1: Regulated industry (4400–5000) and Financial industry (6000–6999) are excluded. Any observations with missing data to calculate model variables are also deleted.

(The table is continued on the next page.)

TABLE 3.1 (Continued)

Panel D: Length of Earnings Strings (1988–2008)

Length of ES	Frequency	%
5	646	50.59%
6	287	22.47%
7	133	10.42%
8	83	6.50%
9	52	4.07%
10	38	2.98%
11	10	0.78%
12	10	0.78%
13	9	0.70%
14	1	0.08%
15	5	0.39%
16	0	0.00%
17	0	0.00%
18	2	0.16%
19	0	0.00%
20	1	0.08%
Total	1,277	100.00%

TABLE 3.2
Variable Distribution for the Original ES Sample (1988–2008; N = 1,277 Earnings Strings)

	Mean	Std Dev	Min	25%	50%	75%	Max	N
$RDISX^{PM}$	−0.0053	0.5759	−6.3666	−0.2100	−0.0046	0.1983	6.5179	9,164
$RDISX^{PA}$	−0.0420	0.4101	−4.6592	−0.1657	−0.0050	0.1256	5.3250	9,164
RDISX	0.0002	0.4204	−5.3028	−0.1103	0.0451	0.1912	4.6918	9,164
Size	5.6350	2.3805	0.2108	3.9386	5.6424	7.3076	11.2144	9,164
BTM	0.4394	0.4779	−1.3432	0.2026	0.3511	0.5855	2.4769	9,164
Leverage	0.2033	0.2293	0.0000	0.0210	0.1553	0.3035	1.4674	9,164
NewIssue	0.8317	0.3741	0.0000	1.0000	1.0000	1.0000	1.0000	9,164

Note 1: All continuous control variables are winsorized at the top and bottom 1 percent of their respective distributions.

Please refer to **Appendix 3-I** for the variable definitions and measurements.

TABLE 3.3
Pearson and Spearman Correlations for the Original ES Sample (1988–2008; N = 1,277 Earnings Strings)

	$RDISX^{PM}$	$RDISX^{PA}$	*RDISX*	*Size*	*BTM*	*Leverage*	*NewIssue*
$RDISX^{PM}$	**1.0000**	*0.6176*	*0.5815*	*0.0131*	*0.0342*	*0.0550*	*−0.0344*
		<.0001	*<.0001*	*0.2113*	*0.0011*	*<.0001*	*0.0010*
$RDISX^{PA}$	*0.6350*	**1.0000**	*0.9028*	*0.0260*	*0.0844*	*0.0536*	*−0.0568*
	<.0001		*<.0001*	*0.0127*	*<.0001*	*<.0001*	*<.0001*
RDISX	*0.5890*	*0.8431*	**1.0000**	*0.1060*	*0.1627*	*−0.0114*	*−0.0447*
	<.0001	*<.0001*		*<.0001*	*<.0001*	*0.2736*	*<.0001*
Size	*0.0165*	*0.0087*	*0.0525*	**1.0000**	*−0.2341*	*−0.1433*	*0.1998*
	0.1149	*0.4033*	*<.0001*		*<.0001*	*<.0001*	*<.0001*
BTM	*0.0652*	*0.1018*	*0.1570*	*−0.2898*	**1.0000**	*−0.2024*	*−0.1907*
	<.0001	*<.0001*	*<.0001*	*<.0001*		*<.0001*	*<.0001*
Leverage	*0.0602*	*0.0783*	*0.1048*	*−0.0114*	*0.0720*	**1.0000**	*−0.1068*
	<.0001	*<.0001*	*<.0001*	*0.2773*	*<.0001*		*<.0001*
NewIssue	*−0.0289*	*−0.0401*	*−0.0364*	*0.1939*	*−0.1791*	*−0.0858*	**1.0000**
	0.0057	*0.0001*	*0.0005*	*<.0001*	*<.0001*	*<.0001*	

Note 1: *Pearson* correlation coefficients are reported above the diagonal and *Spearman* rank correlation coefficients are reported below the diagonal. The corresponding *p*-values appear underneath the correlation coefficients.

Please refer to **Appendix 3-I** for the variable definitions and measurements.

TABLE 3.4
Univariate Tests for the Original ES Sample (1988–2008; N = 1,277 Earnings Strings)

Panel A: Frequency Distribution of the Peak Level of *RDISX*^{PM}

Period	Total Observations		Expected Number of Peaks	Observed Number of Peaks
	(1). N	(2). %	(3) = 889 * (2)	(4)
Early-ES	5,333	58.20%	743	693
Late-ES	2,554	27.87%	356	408
Break Year	1,277	13.93%	178	176
Total	9,164	100.00%	1,277	1,277

Chi-square	12.8194
p-value	0.0016

Panel B: Mean and Median Comparisons

		Mean	Median	N
(1)	**Early-ES**	−0.0170	−0.0123	5,333
(2)	**Late-ES**	0.0096	0.0132	2,554
(3)	**Break Year**	0.0140	−0.0074	1,277
(4)	**(2) − (1)**	0.0266 *	0.0255 ***	
(5)	**(3) − (1)**	0.0310 *	0.0049	
(6)	**(3) − (2)**	0.0044	−0.0206	

Note 1: Early-ES, Late-ES and Break Year are defined as the period from the first year to the third last year of an earnings string, the final two years of an earnings string and the year immediately following the end of an earnings string, respectively.
Note 2: In **Panel B**, mean comparisons are based on *t*-tests and median comparisons are based on Wilcoxon tests. ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).

TABLE 3.5
Regression Results based on the Original ES Sample

Sample Period: 1988–2008
Model: $RDISX_{it}^{PM} = \beta_0 + \beta_1 \bullet LateES_{it} + \beta_2 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1}$
$+\gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet NewIssue_{it} + \gamma_j \bullet IndustryDummy$
$+\gamma_t \bullet YearDummy + \varepsilon_{it}$

	Prediction	Coeff.	*t*-stat	*p*-value
Test Variables				
LateES	+	0.0295	1.85	0.0327
Break	+/insignificant	0.0251	1.27	0.1030
Control Variables				
Size		0.0151	2.76	0.0060
BTM		0.0926	3.38	0.0008
Leverage		0.2303	3.38	0.0007
NewIssue		−0.0539	−2.55	0.0109
YearDummy		Yes		
IndustryDummy		Yes		
Adjusted R^2		1.73%		
N		9,164 firm-year obs. (1,277 earnings strings)		

Note 1: $RDISX^{PM}$ represents performance-matched abnormal discretionary expenses multiplied by−1, calculated as −1 times the difference between an ES sample firm *i*'s abnormal discretionary expenses and abnormal discretionary expenses of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group.
Note 2: *LateES* and *Break* are test variables representing the last two years of an earnings string and the year immediately following the end of an earnings string, respectively. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 3-I** for definitions and measurements of control variables.

TABLE 3.6
Regression Results based on Alternative ES Samples

Sample Period: 1988–2008
Model: $RDISX_{it}^{PM} = \beta_0 + \beta_1 \bullet LateES_{it} + \beta_2 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1}$
$+ \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet NewIssue_{it} + \gamma_j \bullet IndustryDummy$
$+ \gamma_t \bullet YearDummy + \varepsilon_{it}$

	Prediction	(1). Subsample 1			(2). Subsample 2		
		Coeff.	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
Test Variables							
LateES	+	0.0342	1.91	0.0285	0.0558	2.15	0.0159
Break	+/Insignificant	0.0244	1.08	0.1397	0.0821	2.38	0.0089
Control Variables							
Size		0.0174	2.93	0.0035	0.0050	0.59	0.5528
BTM		0.0963	3.37	0.0008	0.0815	2.09	0.0367
Leverage		0.2419	3.34	0.0009	0.2774	2.43	0.0153
NewIssue		−0.0685	−2.90	0.0038	−0.0583	−1.73	0.0848
YearDummy			Yes			Yes	
IndustryDummy			Yes			Yes	
Adjusted R^2			1.80%			1.17%	
N			7,920 firm-year obs. (1,103 earnings strings)			3,876 firm-year obs. (646 earnings strings)	

Note 1: $RDISX^{PM}$ represents performance-matched abnormal discretionary expenses multiplied by −1, calculated as −1 times the difference between an ES sample firm *i*'s abnormal discretionary expenses and those of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group.
Note 2: *LateES* and *Break* are test variables representing the last two years of an earnings string and the year immediately following the end of an earnings string, respectively. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.
Note 3: In Column (1), Subsample 1 consists of 1,103 ES firms with only one earnings string. Its sample size (7,920 observations) is smaller than the original ES sample by 1,244 firm-year observations, of which 637 relate to the first earnings string and 607 to the second string.
Note 4: In Column (2), Subsample 2 consists of 625 ES firms with five-year length of an earnings string. Among 646 earnings strings, 21 are the second string for a particular firm. The corresponding firm-year observations are 3,876, of which 3,230 within an earnings string and 646 from the break year (646 strings x 5 years + 646 from the break year = 3,876 firm-year observations).

Please refer to **Appendix 3-I** for definitions and measurements of control variables.

TABLE 3.7
Sensitivity Tests based on Alternative RM Proxies

Sample Period: 1988–2008
Model used in Panels C–E: $Y_{it} = \beta_0 + \beta_1 \bullet LateES_{it} + \beta_2 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1}$
$+\gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet NewIssue_{it} + \gamma_j \bullet IndustryDummy$
$+\gamma_t \bullet YearDummy + \varepsilon_{it}$

Panel A: Frequency Distribution of Peak of RM based on the Original ES Sample

Period	Total Firm-Year Observations		Expected Number of Peaks	Observed Number of Peaks	
				$RDISX^{PA}$	$RDISX$
	(1). N	(2). %	(3) = 889 * (2)	(4)	(5)
Early-ES	5,333	58.20%	743	663	524
Late-ES	2,554	27.87%	356	398	370
Break Year	1,277	13.93%	178	216	383
Total	9,164	100.00%	1,277	1,277	1,277

Chi-square	25.2846	350.2750
p-value	<.0001	<.0001

Panel B: Mean and Median Comparisons based on the Original ES Sample

		(1). $RDISX^{PA}$		(2). $RDISX$	
		Mean	**Median**	**Mean**	**Median**
(1)	**Early-ES**	−0.0506	−0.0093	−0.0197	0.0319
(2)	**Late-ES**	−0.0265	0.0054	0.0233	0.0608
(3)	**Break Year**	−0.0370	−0.0116	0.0368	0.0675
(4)	**(2) − (1)**	0.0241 **	0.0147 **	0.0430 ***	0.0289 ***
(5)	**(3) − (1)**	0.0136	0.0023	0.0565 ***	0.0356 ***
(6)	**(3) − (2)**	−0.0105	−0.0170 *	0.0135	0.0067 **

(The table is continued on the next page.)

TABLE 3.7 (Continued)

Panel C: Multivariate Results based on the Original ES Sample

	Y_{it}	(1). $RDISX^{PA}$			(2). $RDISX$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
Test Variables							
LateES	+	0.0408	3.52	0.0002	0.0549	4.64	<.0001
Break	+/insignificant	0.0258	1.65	0.0496	0.0554	3.56	0.0002
Adjusted R^2		3.66%			8.17%		
N		9,164 firm-year obs. (1,277 earnings strings)			9,164 firm-year obs. (1,277 earnings strings)		

Panel D: Multivariate Results based on Subsample 1 (One Earnings String Only)

	Y_{it}	(1). $RDISX^{PA}$			(2). $RDISX$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
Test Variables							
LateES	+	0.0404	3.13	0.0009	0.0606	4.50	<.0001
Break	+/insignificant	0.0244	1.37	0.0859	0.0566	3.18	0.0008
Adjusted R^2		3.90%			8.24%		
N		7,920 firm-year obs. (1,103 earnings strings)			7,920 firm-year obs. (1,103 earnings strings)		

(The table is continued on the next page.)

TABLE 3.7 (Continued)

Panel E: Multivariate Results based on Subsample 2 (Five-year Earnings String Only)

	Y_{it}	(1). $RDISX^{PA}$			(2). *RDISX*		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
Test Variables							
LateES	+	0.0470	2.46	0.0072	0.0596	3.06	0.0012
Break	+/insignificant	0.0418	1.51	0.0664	0.0554	2.06	0.0198
Adjusted R^2		3.61%			7.33%		
N		3,876 firm-year obs. (646 earnings strings)			3,876 firm-year obs. (646 earnings strings)		

Note 1: $RDISX^{PA}$ and *RDISX* represent performance-adjusted and performance-unadjusted abnormal discretionary expenses multiplied by −1, respectively. $RDISX^{PA}$ is calculated as −1 times the difference between an ES sample firm *i*'s abnormal discretionary expenses and the median unadjusted abnormal discretionary expenses for that firm's industry-*ROA* decile in the same year. *RDISX* is defined as −1 times the residuals from Equation (3-2) (summarized in Appendix 3-II).

Note 2: In **Panels A–B**, Early-ES, Late-ES and Break Year are defined as the period from the first year to the third last year of an earnings string, the last two years of an earnings string and the year immediately following the end of an earnings string, respectively.

Note 3: In **Panel B**, mean comparisons are based on *t*-tests and median comparisons are based on Wilcoxon tests. ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).

Note 4: In **Panels C–E**, *LateES* and *Break* are test variables in Equation (3-1) representing the last two years of an earnings string and the year immediately following the end of an earnings string, respectively. Results on control variables are not reported to conserve space. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 3-I** for definitions and measurements of control variables.

TABLE 3.8
Further Analysis: Results based on the Refined Definition of Early and Late ES-Periods

Sample Period: 1988–2008
Model used in Panels C–E: $Y_{it} = \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet -2Break_{it} + \beta_3 \bullet -1Break_{it}$
$+\beta_4 \bullet Break_{it} + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1}$
$+\gamma_4 \bullet NewIssue_{it} + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$

Panel A: **Frequency Distribution of Peak of RM based on the Original ES Sample**

Period	**Total Firm-Year Observations**		**Expected Number of Peaks**	**Observed Number of Peaks**		
				RDISX^{PM}	***RDISX^{PA}***	***RDISX***
	(1). N	**(2). %**	**(3) = 889 * (2)**	**(4)**	**(5)**	**(6)**
Early-ES	2,554	27.87%	356	344	347	310
Mid-ES	2,779	30.33%	387	349	316	214
−2Break	1,277	13.93%	178	190	174	138
−1Break	1,277	13.93%	178	218	224	232
Break Year	1,277	13.93%	178	176	216	383
Total	9,164	100.00%	1,277	1,277	1,277	1,277

Chi-square	16.2991	38.8935	400.9708
p-value	0.0026	<.0001	<.0001

(The table is continued on the next page.)

TABLE 3.8 (Continued)

Panel B: Mean and Median Comparisons based on the Original ES Sample

		(1). $RDISX^{PM}$		(2). $RDISX^{PA}$		(3). $RDISX$	
		Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**
(1)	**Early-ES**	−0.0186	−0.0181	−0.0535	−0.0130	−0.0217	0.0299
(2)	**Mid-ES**	−0.0155	−0.0077	−0.0479	−0.0050	−0.0178	0.0327
(3)	**−2Break**	−0.0109	0.0045	−0.0387	0.0012	−0.0007	0.0519
(4)	**−1Break**	0.0301	0.0244	−0.0142	0.0100	0.0472	0.0692
(5)	**Break Year**	0.0140	−0.0074	−0.0370	−0.0116	0.0368	0.0675
(6)	**(3) − (2)**	0.0046	0.0122	0.0092	0.0062	0.0171	0.0192 *
(7)	**(3) − (1)**	0.0077	0.0226*	0.0148	0.0142	0.0210	0.0220 **
(8)	**(4) − (2)**	0.0456**	0.0321***	0.0337**	0.0150	0.0650 ***	0.0365 ***
(9)	**(4) − (1)**	0.0487**	0.0425***	0.0393***	0.0230 ***	0.0689 ***	0.0393 ***
(10)	**(5) − (2)**	0.0295	0.0003	0.0109	−0.0066	0.0546 ***	0.0348 ***
(11)	**(5) − (1)**	0.0326*	0.0107	0.0165	0.0014	0.0585 ***	0.0376 ***
(12)	**(5) − (3)**	0.0249	−0.0119	0.0017	−0.0128	0.0375 **	0.0156 ***
(13)	**(5) − (4)**	−0.0161	−0.0318**	−0.0228	−0.0216 **	−0.0104	−0.0017

(The table is continued on the next page.)

TABLE 3.8 (Continued)

Panel C: Multivariate Results based on the Original ES Sample

Y_{it}		(1). $RDISX^{PM}$			(2). $RDISX^{PA}$			(3). $RDISX$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
MidES	?	0.0182	1.04	0.2986	0.0235	2.05	0.0409	0.0204	1.79	0.0734
−2Break	+	0.0178	0.83	0.2047	0.0423	2.97	0.0015	0.0453	3.30	0.0005
−1Break	+	0.0651	2.91	0.0018	0.0686	4.04	<.0001	0.0909	5.19	<.0001
Break	+/insignificant	0.0377	1.58	0.0574	0.0407	2.23	0.0130	0.0693	3.79	0.0001
Adj. R^2		1.76%			3.71%			8.26%		
N		9,164 firm-year obs. (1,277 earnings strings)			9,164 firm-year obs. (1,277 earnings strings)			9,164 firm-year obs. (1,277 earnings strings)		

Panel D: Multivariate Results based on Subsample 1 (One Earnings String Only)

Y_{it}		(1). $RDISX^{PM}$			(2). $RDISX^{PA}$			(3). $RDISX$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
MidES	?	0.0220	1.12	0.2638	0.0209	1.62	0.1066	0.0222	1.71	0.0867
−2Break	+	0.0244	1.01	0.1565	0.0392	2.53	0.0058	0.0517	3.30	0.0005
−1Break	+	0.0727	2.88	0.0020	0.0682	3.52	0.0003	0.0983	4.87	<.0001
Break	+/insignificant	0.0393	1.45	0.0742	0.0380	1.81	0.0352	0.0716	3.40	0.0004
Adj. R^2		1.84%			3.93%			8.32%		
N		7,920 firm-year obs. (1,103 earnings strings)			7,920 firm-year obs. (1,103 earnings strings)			7,920 firm-year obs. (1,103 earnings strings)		

(The table is continued on the next page.)

TABLE 3.8 (Continued)

Panel E: Multivariate Results based on Subsample 2 (Five-year Earnings String Only)

Y_{it}		(1). $RDISX^{PM}$			(2). $RDISX^{PA}$			(3). $RDISX$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
MidES	?	−0.0553	−1.66	0.0967	−0.0325	−1.56	0.1188	−0.0294	−1.44	0.1515
−2Break	+	0.0168	0.53	0.2988	0.0200	0.95	0.1709	0.0243	1.24	0.1084
−1Break	+	0.0538	1.59	0.0557	0.0503	1.99	0.0234	0.0745	2.78	0.0028
Break	+/insignificant	0.0625	1.61	0.0545	0.0307	1.05	0.1977	0.0464	1.63	0.0520
Adj. R^2		1.22%			3.64%			7.41%		
N		3,876 firm-year obs. (646 earnings strings)			3,876 firm-year obs. (646 earnings strings)			3,876 firm-year obs. (646 earnings strings)		

Note 1: $RDISX^{PM}$, $RDISX^{PA}$ and *RDISX* represent performance-matched, performance-adjusted, and performance-unadjusted abnormal discretionary expenses multiplied by −1, respectively. $RDISX^{PM}$ is calculated as −1 times the difference between an ES sample firm *i*'s abnormal discretionary expenses and those of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group. $RDISX^{PA}$ is calculated as −1 times the difference between an ES sample firm *i*'s abnormal discretionary expenses and the median unadjusted abnormal discretionary expenses for that firm's industry-*ROA* decile in the same year. *RDISX* is defined as −1 times the residuals from Equation (3-2) (summarized in Appendix 3-II).

Note 2: In **Panels A–B**, Early-ES, Mid-ES, −2Break, −1Break and Break Year are defined as the first two years of an earnings string, the period from the third year to the third last year of an earnings string, the second last year of an earnings string, the last year of an earnings string and the year immediately following the end of an earnings string, respectively.

Note 3: In **Panel B**, mean comparisons are based on *t*-tests and median comparisons are based on Wilcoxon tests. ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).

Note 4: In **Panels C–E**, *MidES*, *−2Break*, *−1Break* and *Break* are test variables in Equation (3-3) representing the period from the third year to the third last year of an earnings string, the second last year of an earnings string, the last year of an earnings string and the year immediately following the end of an earnings string, respectively. Results on control variables are not reported to conserve space. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 3-I** for definitions and measurements of control variables.

FIGURE 3.1: Patterns of Real Activity Management by Year

Figure 3.1A: Patterns of Mean Real Management

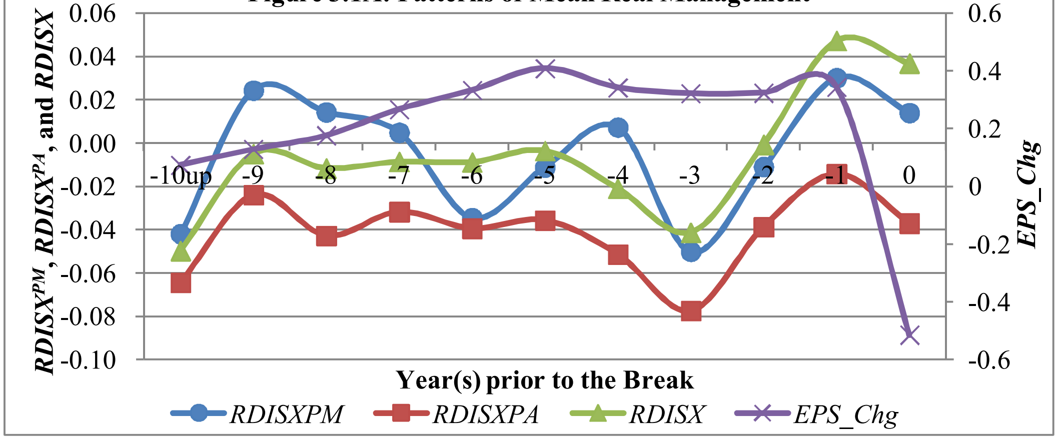
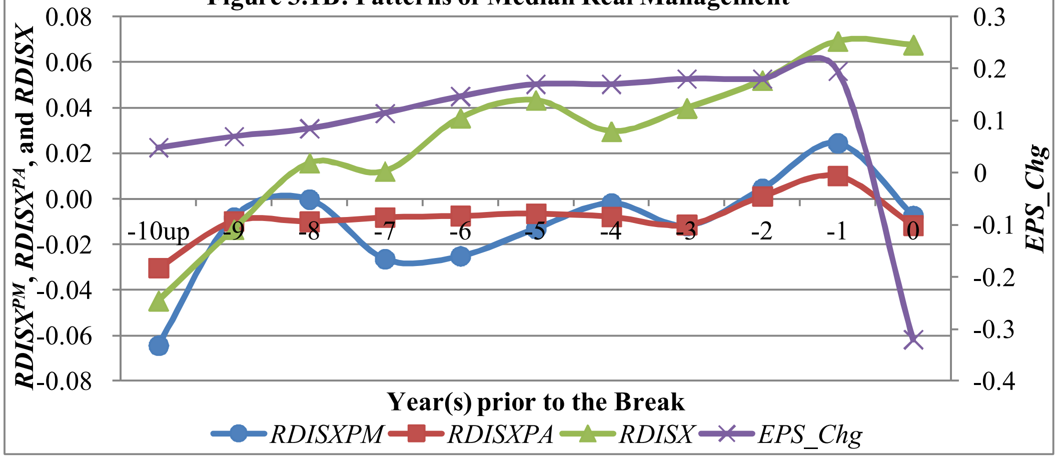


Figure 3.1B: Patterns of Median Real Management



Note 1: These two graphs depict real activity management pattern by year along an earnings string. The sample period covers from 1988 to 2008 and the sample consists of 1,277 earnings strings (1,190 firms), or equivalently 9,164 firm-year observations including the break year. The X axis represents each year within an earnings string, where 0 represents the break year and –t denotes t years before the break. Firm-year observations that fall in 10 to 20 years before the break are combined and labelled −10up, because there are only 92, amounting to less than 1 percent of the total sample. The Y axis represents the level of real activity management (proxied by $RDISX^{PM}$, $RDISX^{PA}$ and *RDISX*) along with that of earnings changes (i.e., *EPS_Chg*).

Note 2: *EPS_Chg* represents changes in EPS, and is winsorized to −1.5 and +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991); $RDISX^{PM}$ represents performance-matched abnormal discretionary expenses multiplied by−1, defined as −1 times the difference between an ES sample firm *i*'s abnormal discretionary expenses and those of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group; $RDISX^{PA}$ represents performance-adjusted abnormal discretionary expenses multiplied by−1, defined as −1 times the difference between an ES sample firm *i*'s abnormal discretionary expenses and the median unadjusted abnormal discretionary expenses for that firm's industry-*ROA* decile in the same year; *RDISX* represents performance-unadjusted abnormal discretionary expenses multiplied by−1, defined as − 1 times the residuals from Equation (3-2) (summarized in Appendix 3-II).

FIGURE 3.2: Patterns of Real Activity Management by Sub-period

Figure 3.2A: Patterns of Mean Real Management

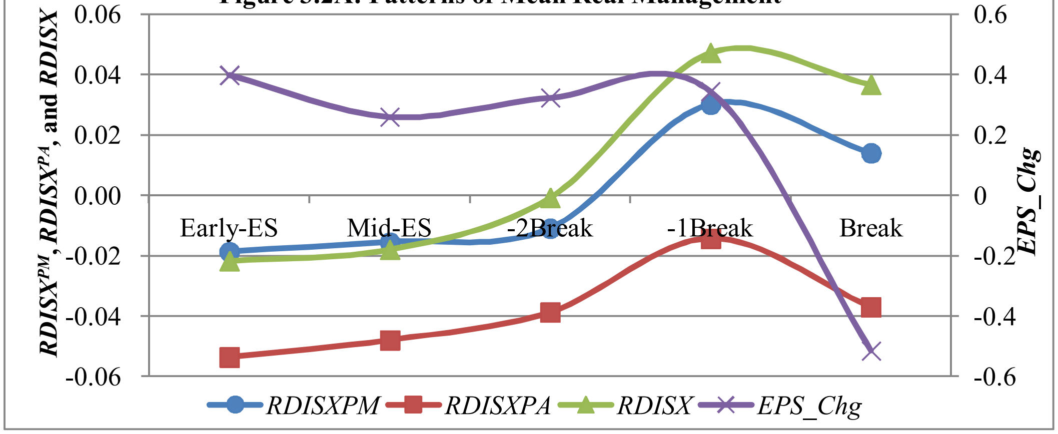
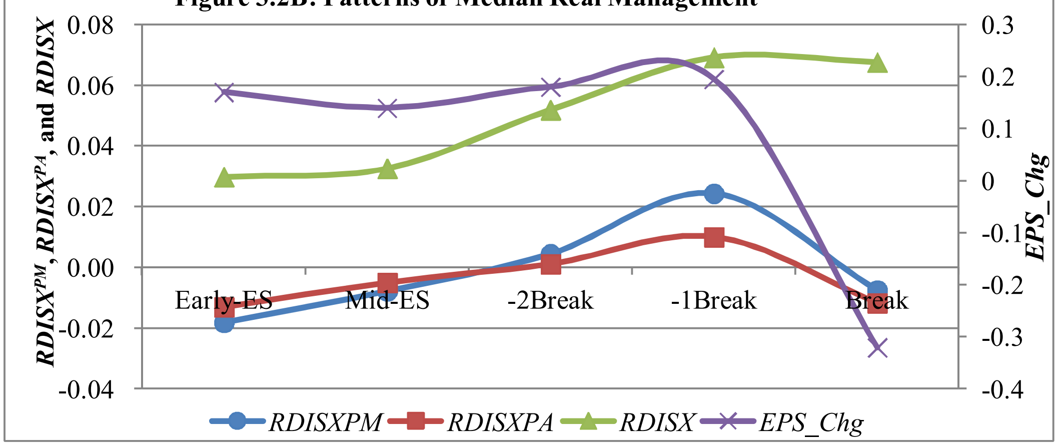


Figure 3.2B: Patterns of Median Real Management



Note 1: These two graphs depict real activity management pattern along five sub-periods of an earnings string. The sample period covers from 1988 to 2008 and the sample consists of 1,277 earnings strings (1,190 firms), or equivalently 9,164 firm-year observations. Each earnings string is divided into five sub-periods: Early-ES (the first two years of an earnings string), Mid-ES (the period from the third year of an earnings string to three years before the break), −2Break (two years before the break), −1Break (one year before the break) and Break (the year when an earnings string is broken). The X axis represents each of the five sub-periods of an earnings string and the Y axis represents the level of real activity management (proxied by $RDISX^{PM}$, $RDISX^{PA}$ and *RDISX*) along with that of earnings changes (i.e., *EPS_Chg*).

Note 2: *EPS_Chg* represents changes in EPS, and is winsorized to −1.5 and +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991); $RDISX^{PM}$ represents performance-matched abnormal discretionary expenses multiplied by−1, defined as −1 times the difference between an ES sample firm *i*'s abnormal discretionary expenses and those of a non-ES firm that has the closest return on assets (*ROA*) within the same industry-year group; $RDISX^{PA}$ represents performance-adjusted abnormal discretionary expenses multiplied by−1, defined as −1 times the difference between an ES sample firm *i*'s abnormal discretionary expenses and the median unadjusted abnormal discretionary expenses for that firm's industry-*ROA* decile in the same year; *RDISX* represents performance-unadjusted abnormal discretionary expenses multiplied by−1, defined as −1 times the residuals from Equation (3-2) (summarized in Appendix 3-II).

CHAPTER 4

Market Response to ES Firms that Engage in Earnings Management

4.1 INTRODUCTION

In Chapters 2 and 3, I examined the patterns of accrual and real activity management by firms with consecutive earnings increases for at least five years (i.e., ES firms). Results indicate that ES firms use aggressive accrual management and real activity management to increase reported earnings near the end of an earnings string. While the extent of accrual management (labelled AM hereinafter) declines during the break year of an earnings string, there is no evidence of similar reduction in real activity management (labelled RM hereinafter). These findings enhance one's understanding of how earnings momentum is sustained throughout an earnings string.

Building on Chapters 2 and 3, in Chapter 4 I turn to the questions of whether the capital market can detect earnings management by ES firms to sustain an earnings string and if the market reacts to AM and RM activities differently. This line of enquiry is motivated by accounting research documenting the existence of both market rewards to firms that achieve an earnings momentum and penalties to the break of an earnings string (Ghosh, Gu and Jain 2005; Barth, Elliott and Finn 1999). I extend the literature to consider the implications of earnings management for market response to earnings momentum during as well as near the end of an earnings string. Chapter 4 also relates to another stream of research looking into the trade-offs between AM and RM as a means to manage earnings (Zang 2007; Roychowdhury 2006). My focus differs from these studies in that I examine the way the market reacts to AM and RM and, in particular, whether one earnings management technique is easier for the market to detect, compared to the other.

My research design calls for partitioning ES firms into the high vs. the low AM groups, defined as ES firms with the above median vs. below median performance-matched discretionary accruals (labelled $DACC^{PM}$). The high and the low RM groups are defined analogously using the median value of performance-matched abnormal discretionary expenses multiplied by -1 (labelled $RDISX^{PM}$). Following Barth et al. (1999), I use three proxies for market response, i.e., stock price, changes in stock price, and market-adjusted return. Results indicate that both the mean and the median values of market response are generally larger for the low AM group, compared to the high AM group. While the market discounts rewards given to ES firms that engage in aggressive AM activities during an earnings string, it seems to be unable to detect real activity manipulations. On average, changes in stock price and market-adjusted return are statistically similar across the high and the low RM groups. Moreover, the mean and median values of stock price are significantly higher for the high RM group than for the low RM group.

To address these research questions more formally, I next regress each of the three proxies for market response separately on earnings (or changes in earnings). For the AM-based analysis, the test variable is reflected in the interaction between earnings (or changes in earnings) and an indicator variable $DACC^{PM}\_H$, representing ES firms with high values of $DACC^{PM}$. After controlling for several factors modeled by Barth et al. (1999) as affecting earnings response coefficients (labelled ERC hereinafter), I find that the coefficient estimate on the interaction term is negative and significant in all three ERC regressions at the conventional levels, implying a relatively lower ERC for ES firms with high AM. These results continue to hold when I use performance-adjusted discretionary accruals (labelled $DACC^{PA}$ hereinafter) or performance-unadjusted discretionary accruals (labelled *DACC* hereinafter) to proxy for accrual management.

I then extend the analysis to RM by regressing each of the three market response proxies on earnings (or changes in earnings) and an interaction term between earnings (or changes in earnings) and an indicator variable $RDISX^{PM}\_H$, representing ES firms with high values of $RDISX^{PM}$. The interaction term is negative and significant in the Price-Level regression, but is insignificantly different from zero in the Price-Change and Market-Return regressions. Results become even weaker when an alternative proxy for real activity management is employed, i.e., performance-adjusted or performance-unadjusted abnormal discretionary expenses multiplied by -1 (labelled $RDISX^{PA}$ or *RDISX* hereinafter). Taken together, evidence suggests that the market has a limited ability to detect

RM. As a result, it offers a similar level of rewards to ES firms which may have sustained earnings strings through aggressive real activity management.

To shed additional light on the market's ability (inability) to identify accrual (real activity) manipulations, I conduct further analysis by dividing my sample into three groups, where firms whose values of $DACC^{PM}$ ($RDISX^{PM}$) fall in the top-third of the $DACC^{PM}$ ($RDISX^{PM}$) distribution are labelled as the high AM (RM) group and those in the middle- and bottom-third are referred to as the moderate and the low AM (RM) groups, respectively. The two test variables in the Price-Level regression are given by $DACC^{PM}\_H*E$ and $DACC^{PM}\_M*E$ (or $RDISX^{PM}\_H*E$ and $RDISX^{PM}\_M*E$), representing the interaction between earnings and an indicator variable set equal to one if an observation's $DACC^{PM}$ ($RDISX^{PM}$) falls in the top-third and the middle-third of $DACC^{PM}$ ($RDISX^{PM}$) distribution, respectively. The test variables in the Price-Change and Market-Return regressions are defined analogously. Results indicate that the coefficient estimate on interaction term involving $DACC^{PM}\_H$ is negative and significant in all three ERC regressions at the 5 percent level or better. With the exception of one case, the coefficient involving $DACC^{PM}\_M$ is also significant at the conventional levels. More importantly, the coefficient estimate on the high AM group is generally more negative with stronger *t*-statistics than the estimate on the moderate AM group. By comparison, the results in the RM-based analysis are mixed. While the coefficient estimates on both test variables are negative and significant in the Price-Level regression, they are either insignificantly different from zero or positive and significant in the other two ERC regressions.

Chapter 4 contributes to the academic literature which has shown that the capital market rewards firms reporting consecutive earnings increases and penalizes those whose earnings strings have come to an end. My findings show that not all ES firms are rewarded equally. In particular, firms that use aggressive accrual management to achieve earnings momentum generally receive smaller market premium than firms with a moderate level of accrual management. The rewards to the latter group in turn are smaller than those received by firms engaged in a low level of accrual management. Real activity management on the other hand proves more difficult for the capital market participants to detect.

The remainder of Chapter 4 is organized as follows. Section 4.2 reviews the related literature. Sections 4.3 and 4.4 summarize data and research design, respectively. Section 4.5 reports the main results, followed by further analysis in Section 4.6. Section 4.7 concludes Chapter 4.

4.2 LITERATURE REVIEW

Chapter 4 is related to research looking into market response to a pattern of consecutive earnings increases. Motivated by the observation that many managers are focused on maintaining steadily increasing earnings, Barth et al. (1999) compare the price-earnings multiples of firms with patterns of increasing earnings vs. other firms and find that the former group has higher price-earnings multiples than the latter group. They also report that the incremental earnings multiples are reduced significantly in the year when an earnings string is broken. Building on

Barth et al. (1999), Lev, Ryan and Wu (2008) examine the market reaction to accounting restatements by firms with a history of earnings growth and report that the response is more negative if restatements eliminate or shorten the history of consecutive earnings increases. Ghosh et al. (2005) also extend Barth et al. (1999) by classifying ES firms based on whether consecutive earnings growth is supported by concurrent revenue growth over the same time period. Arguing that revenues are less susceptible to manipulations than costs, they find results consistent with the prediction that ES firms with revenue momentum have higher earnings quality and hence larger ERC, compared to those without revenue momentum. An implication from Ghosh et al. (2005) is that ERC may be smaller if an earnings string is sustained by aggressive accrual management.

My focus on the effect of accrual management on ERC for firms reporting consecutive earnings increases is indirectly related to the literature on the informativeness of accounting accruals. The traditional view is that investors tend to be fixated on earnings and fail to fully incorporate accruals into stock price on a timely basis (Xie 2001; Sloan 1996). As a result, the trading strategy involving buying stocks of firms with low accruals and selling stocks of firms with high accruals can yield significant abnormal returns. More recently, studies show that the market is capable of differentiating accrual quality. Francis, LaFond, Olsson, and Schipper (2005) for example find that firms with poor accrual quality tend to have relatively higher costs of debt and equity capital.[41] Balsam, Bartov, and

[41] The former is proxied by interest expense to debt and debt ratings, and the latter by earnings-price ratios and equity betas.

Marquardt (2002) report that investors react negatively to firms suspected to have used aggressive discretionary accruals to meet consensus analyst forecasts around their 10-Q filings and moreover, unlike average investors, sophisticated institutional investors can respond to firms' accrual management even before 10-Q filing date. DeFond and Park (2001) turn their attention to market reaction to earnings surprises and document relatively lower ERCs for firms whose abnormal accruals inflate earnings surprises in either direction.[42] Baber, Chen, and Kang (2006) find that stock return is inversely related to the extent of discretionary accruals if, in addition to earnings, both balance sheet and cash flow information are also disclosed. In a similar vein, Levi (2008) shows that voluntary disclosure of accrual information in earnings releases helps investors better assess earnings quality and mitigate accrual anomaly. Consistent with this finding, Louis, Robinson and Sbaraglia (2008) conclude that the market correctly prices accruals for firms that disclose accrual information at earnings announcements, but accrual anomaly remains if such information is not disclosed. Taken together, evidence from the literature suggests that the capital market can identify accrual management and impound it into stock price when investors have reasons to believe such activity may have taken place or have access to timely disclosure of accrual information. Since a sustained earnings momentum draws the attention of the market, it offers a plausible scenario for the conjecture that ES firms that

[42] Specifically, firms with positive earnings surprises use income-increasing abnormal accrual and those with negative earnings surprises use income-decreasing abnormal accrual.

undertake aggressive accrual management receive smaller ERCs than other ES firms.

Earnings however can also be managed using other techniques, such as real activity management (Zang 2007; Roychowdhury 2006). While the incentives to manipulate earnings are similar for AM and RM, each method has its own costs. Accruals for example are typically reversed in the next period or two and receive close scrutiny from external auditors. In contrast, real activity management represents deviations from optimal business operations. While RM can lower firm value in the long run, it is of little concern to external auditors as long as the financial statements properly account for RM. Thus, RM can be far more difficult to detect by the capital market participants than AM. To the extent that the market penalizes ES firms that resort to earnings management to sustain earnings momentum, I expect the reduction in market rewards to be more pronounced for firms that rely on AM, compared to those that use RM. Or equivalently stated, the patterns of reduction in market rewards for ES firms with high AM relative to those with low AM are likely to differ from those characterizing ES firms with high RM vs. low RM. To the best of my knowledge, prior accounting literature has not addressed the question of how the market reacts to RM activities, especially those undertaken by firms to sustain an earnings string.

4.3 DATA AND SAMPLE

The initial sample spans over a 19-year (1989–2007) period and consists of 74,930 firm-year observations.[43] Following the convention in Chapters 2 and 3, I define ES firms as firms with at least five-year consecutive increases in earnings per share (EPS).[44] A total of 8,022 firm-year observations (or 1,295 earnings strings) meet this requirement. I then delete 1,932 firm-year observations (or 302 earnings strings) whose earnings strings continue in the year 2007 and another 857 observations (or 143 earnings strings) that do not provide accounting data in the break year. Combining the resulting 5,233 firm-year observations (or 850 earnings strings) with another 850 firm-year observations from the break year forms 6,083 firm-year observations (labelled ES sample hereinafter). Panel A of Table 4.1 summarizes the selection process for the ES sample. Among the 850 earnings strings, 810 strings are the first earnings string and the remaining 40 strings are the second earnings string for a particular firm. There are 770 firms that have only one earnings string and 40 firms with two earnings strings for a total of 810 firms in the ES sample (see Panel B, Table 4.1).[45]

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[43] Recall that year 1989 is chosen as the start of sample period to allow the calculation of total accruals using the income statement approach, which is considered superior to the balance sheet approach (Hribar and Collins 2002). The initial data for the ES sample are collected from the same Compustat database (between 1987 and 2008) as those used in Chapters 2 and 3. The final sample period for AM model is from 1989 to 2007 because two year lag data and one-year lead data are required to calculate model variables (for example, total assets in 1987 and sales in 2008 are needed to calculate discretionary accruals between 1989 and 2007, see Equation (4-A1) in Appendix 4-II). On the other hand, the sample period for RM model is from 1988 to 2008 since only one year lag data is necessary to calculate model variables (see Equation (4-A2) in Appendix 4-III). Merging these two models leads to the final sample period between 1989 and 2007.

[44] The split-adjusted annual EPS (excluding extraordinary items) is used as a proxy for reported annual earnings.

[45] The ES sample meets all data requirements of Chapters 2 and 3.

I then collect return and financial data required to estimate the three ERC regressions (discussed in Section 4.4) from the CRSP Monthly Stock Database and COMPUSTAT Fundamental Annual Database, respectively. A total of 759 ES firms from the ES sample meet the data requirements for all three ERC regressions (labelled ERC Sample hereinafter). They correspond to 775 earnings strings, or equivalently 5,039 firm-year observations, and form the basis for all the empirical analyses in Chapter 4 (see Panel C, Table 4.1).

[Insert Table 4.1 about Here]

4.4 RESEARCH DESIGN

To test the market response to ES firms' earnings management activities during an earnings string, I follow Barth et al. (1999) and estimate the following three ERC models by pooling across 759 firms in the ERC sample over the entire (1989–2007) sample period:[46]

$$\begin{aligned} P_{it} = \beta_0 + \beta_1 E_{it} &+ \beta_2 DACC^{PM}\_H * E_{it} \text{ (or } \beta_2 RDISX^{PM}\_H * E_{it}) \\ &+ \beta_3 Growth_{it} * E_{it} + \beta_4 EVAR_{it} * E_{it} + \beta_5 DE_{it} * E_{it} + \beta_6 BV_{it} \qquad (4\text{-}1) \\ &+ \beta_t YearDummy + \beta_t YearDummy * E_{it} + \varepsilon_{it} \end{aligned}$$

$$\Delta P_{it} = \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC^{PM}\_H * \Delta E_{it} \text{(or } \beta_2 RDISX^{PM}\_H * \Delta E_{it})$$

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[46] All variables except for E, ΔE, and $EVAR$ in Equations (4-1), (4-2), and (4-3) are winsorized at the top and bottom 1% to mitigate the effects of outliers. I winsorize E and ΔE at the minimum value of −1.5 and the maximum value of +1.5 (see Barth, Hodder, and Stubben 2008; Kothari, Laguerre, and Leone 2002; and Easton and Harris 1991) and $EVAR$ to 100 (see Barth et al. 1999). In reporting t-values, I use the robust standard errors to correct for potential problems associated with heteroskedasticity and firm clustering (Petersen 2009).

$$+ \beta_3 Growth_{it} * \Delta E_{it} + \beta_4 EVAR_{it} * \Delta E_{it} + \beta_5 DE_{it} * \Delta E_{it} + \beta_6 \Delta BV_{it} \quad (4\text{-}2)$$

$$+ \beta_t YearDummy + \beta_t YearDummy * \Delta E_{it} + \varepsilon_{it}$$

$$Ret_{it} = \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC^{PM}\_H * \Delta E_{it} (\text{or } \beta_2 RDISX^{PM}\_H * \Delta E_{it})$$

$$+ \beta_3 Growth_{it} * \Delta E_{it} + \beta_4 EVAR_{it} * \Delta E_{it} + \beta_5 DE_{it} * \Delta E_{it} + \beta_6 \Delta BV_{it} \quad (4\text{-}3)$$

$$+ \beta_t YearDummy + \beta_t YearDummy * \Delta E_{it} + \varepsilon_{it}$$

where subscripts i and t represent firm i in year t. Equation (4-1), the Price-Level regression, examines the relationship between stock price and earnings (labelled E_{it} hereinafter),[47] whereas Equation (4-2) (Equation (4-3)), the Price-Change (Market-Return) regression, studies the relationship between changes in stock price (market-adjusted return) and changes in earnings scaled by stock price at the end of previous year (labelled ΔE_{it} hereinafter).

Dependent Variables

The dependent variable in Equation (4-1), P_{it}, represents the stock price measured at three months after the fiscal yearend; and the dependent variable in Equation (4-2), ΔP_{it}, is given by changes in stock price scaled by stock price at the end of previous year (three months after the previous fiscal yearend), i.e., $[P_t - P_{t-1}]/P_{t-1}$. Finally, market-adjusted return, Ret_{it}, is the dependent variable in Equation (4-3), defined as a firm's compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend minus the compound annual return of value-weighted market index[48] over the same 12-month period.[49]

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[47] E_{it} is defined as the split-adjusted annual EPS (excluding extraordinary items).

[48] All results (untabulated) are similar when the equal-weighted market index return or size decile return (exchange-matched size decile) is used instead of the value-weighted market index return as the benchmark return in calculating *Ret*.

Test Variables

To address the question of whether ERC varies with ES firms' level of earnings management, I include an interaction term between a proxy for the high AM or the high RM group and E_{it} (ΔE_{it}) in Equation (4-1) (Equations (4-2) and (4-3)). In all three ERC models, the indicator variable $DACC^{PM}\_H$ ($RDISX^{PM}\_H$) is used to proxy for the high AM (RM) group, and is set equal to one if the level of performance-matched discretionary accruals (performance-matched abnormal discretionary expenses multiplied by −1),[50] i.e., $DACC^{PM}_{it}$ ($RDISX^{PM}_{it}$), is above the median value for the ERC sample and zero otherwise.

A negative and significant coefficient estimate on the test variable, $DACC^{PM}\_H{*}E_{it}$ in Equation (4-1) or $DACC^{PM}\_H{*}\Delta E_{it}$ in Equations (4-2) and (4-3), is consistent with the notion that ERC is lower for ES firms with a high level of $DACC^{PM}$ than those with a low level of $DACC^{PM}$. Likewise, a negative and significant coefficient estimate on the test variable, $RDISX^{PM}\_H{*}E_{it}$ in Equation (4-1) or $RDISX^{PM}\_H{*}\Delta E_{it}$ in Equations (4-2) and (4-3), implies a reduction in ERC for ES firms that undertake a high level of real activity management. As robustness checks discussed in Section 4.5.5, I also replicate all the analyses using

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[49] I measure stock price at three months after the fiscal yearend and calculate return over the 12-month period ending three months after the fiscal yearend to ensure that accounting information is publicly available to investors (see Kraft, Leone and Wasley 2006; Xie 2001; Sloan 1996; Alford, Jones and Zmijewski 1994).

[50] As in Chapters 2 and 3, the performance-matched discretionary accruals are calculated by subtracting discretionary accruals of the matched non-ES firm that has the closest return on assets (*ROA*) from each ES firm's discretionary accruals (see Kothari, Leone and Wasley 2005). The performance-matched abnormal discretionary expenses are calculated analogously using abnormal discretionary expenses. Discretionary accruals and abnormal discretionary expenses are estimated from the forward-looking modified-Jones model (Dechow, Richardson and Tuna 2003) and Roychowdhury (2006), respectively.

alternative measures of earnings management, i.e., performance-adjusted[51] and performance-unadjusted accrual and real activity management (i.e., $DACC^{PA}_{it}$ and $RDISX^{PA}_{it}$, and $DACC_{it}$ and $RDISX_{it}$), as I did in Chapters 2 and 3.

Control Variables

Following Barth et al. (1999), I include several control variables that interact with either E_{it} (Equation (4-1)) or ΔE_{it} (Equations (4-2) and (4-3)). They are growth ($Growth_{it}$), measured as five-year compounded annual growth rate of book value of equity, i.e. $[BVE_{it} \; / \; BVE_{it-5}]^{1/5}$; earnings variability ($EVAR_{it}$), measured as variance of the past six years' percentage changes in earnings; debt-to-equity ratio (DE_{it}); and *YearDummies*, which enter the ERC models directly as well as through interaction with either E_{it} or ΔE_{it}. In addition, I control for the book value of equity per share (BV_{it}) in Equation (4-1) or changes in the book value of equity per share scaled by stock price at the end of previous year (ΔBV_{it}) in Equations (4-2) and (4-3). To ease exposition, subscripts *i* and *t* are suppressed in the subsequent discussion. Appendix 4-I summarizes the definitions and measurements of all the model variables. Appendices 4-II and 4-III discuss how discretionary accruals and abnormal discretionary expenses are estimated.

[Insert Appendices 4-I, 4-II and 4-III about Here]

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[51] As in Chapters 2 and 3, the performance-adjusted discretionary accruals are calculated by subtracting the median discretionary accruals in the same *ROA* declie of the same industry-year group from each ES firm's discretionary accruals (see Cahan and Zhang 2006). The performance-adjusted abnormal discretionary expenses are calculated analogously using abnormal discretionary expenses.

4.5 MAIN ANALYSIS

4.5.1 Consistency Checks with Chapters 2 and 3

The ERC sample of 759 firms for Chapter 4 differs somewhat from those used in Chapters 2 and 3, because the data required to construct AM and RM measures and estimate the three ERC regressions must now be met simultaneously. Nonetheless, the patterns of mean and median values of proxies for AM and RM along the five sub-periods of an earnings string (i.e., Early-ES, –2Break, –1Break, Break and Mid-ES)[52] depicted in Figures 4.1A–4.1D parallel the corresponding patterns in Chapters 2 and 3. In particular, all three measures of AM and RM intensify in the year immediately before the break.[53] Consistent with prior studies, the mean and median values of ΔE are significantly positive during the pre-break periods, but become negative in the break year.

[Insert Figures 4.1A, 4.1B, 4.1C and 4.1D about Here]

As a further consistency check, I replicate the AM analysis in Chapter 2 and the RM analysis in Chapter 3 based on the ERC sample of 759 firms, estimated using the most comprehensive AM and RM regression models employed in those two chapters (see Appendix 4-IV). Consistent with Chapter 2, the coefficient estimates on $-1Break$, $-2Break$ and $MidES$ in the three AM

[52] Recall that these five sub-periods represent the first two years of an earnings string, two years before the break, one year before the break, the break year and the remaining years in an earnings string, respectively.

[53] For the sake of completeness, I depict the patterns for not just performance-matched accrual and real activity management, but also performance-adjusted and performance-unadjusted measures in Figures 4.1A–4.1D (i.e., $DACC^{PM}$, $DACC^{PA}$ and $DACC$; $RDISX^{PM}$, $RDISX^{PA}$ and $RDISX$).

regressions are all positive and mostly significant, whereas that on *Break* is negative and significant at the conventional levels (see Panel A, Table 4.2). Moreover, the estimate on $-1Break$ is more positive with stronger *t*-statistics than the estimate on $-2Break$. The latter in turn has a larger coefficient estimate and stronger *t*-statistics than *MidES*. The above patterns for $-1Break$, $-2Break$ and *MidES* extend to the three RM regressions, but much like Chapter 3, the coefficient on *Break* is either insignificant or positive and significant at the conventional levels (see Panel B, Table 4.2). In short, results in Chapters 2 and 3 are robust to the choice of the sample.

[Insert Appendix 4-IV and Table 4.2 about Here]

4.5.2 Descriptive Statistics

Panel A of Table 4.3 presents the distribution of the dependent variables and control variables (other than *Year* dummies) over the entire ERC sample of 759 firms (or 5,039 firm-year observations). All three dependent variables in Equations (4-1), (4-2) and (4-3) are skewed to the right: *P* ranges from 0.8300 to 100.7500 with mean (median) of 27.7333 (23.7500); ΔP from -0.7327 to 3.0000 with mean (median) of 0.1763 (0.0759); and *Ret* from -0.8056 to 2.6618 with mean (median) of 0.1482 (0.0395). The variables *E* and ΔE have positive mean (median) values of 0.6912 and 0.0373 (0.6700 and 0.0050). Similarly, the mean (median) values of *BV* and ΔBV are positive, i.e., 9.6459 (7.8503) and 0.0237 (0.0392), respectively. On average, the ERC sample tends to have high growth rate of book value of equity (*Growth*; mean = 0.1920), large earnings variability (*EVAR*; mean = 6.6138), and less debt than equity (*DE*; mean = 0.4724).

The corresponding distribution of AM and RM measures, calculated over the ERC sample, appears in Panel B. Both the performance-matched and the performance-adjusted earnings management measures have negative mean values ($DACC^{PM}$ = –0.0124 and $RDISX^{PM}$ = –0.0003; $DACC^{PA}$ = –0.0052 and $RDISX^{PA}$ = –0.0385; see Rows 1–4), whereas the performance-unadjusted earnings management measures have positive mean values (*DACC* = 0.0043 and *RDISX* = 0.0251; see Rows 5–6). In general, the distributions of RM measures are much wider than those of AM measures. While all three AM measures range between –1 and +1, the RM measures are distributed from –3.2480 to 3.3165.

[Insert Table 4.3 about Here]

Table 4.4 presents the mean and median values of proxies for market response (*P*, *ΔP* and *Ret*) in each of the five sub-periods of an earnings string for the ERC sample. The mean and median values of *P* increase from the early to the middle part of an earnings string and then stay at a relatively high level until –2Break, before declining sharply in –1Break (see Column 1). While the mean and median values of *ΔP* and *Ret* are significantly positive in the first three sub-periods (i.e., Early-ES, Mid-ES and –2Break), they are mostly significantly negative in the remaining two sub-periods (i.e., –1Break and Break; see Columns 2 and 3). Comparing these patterns, depicted in Figures 4.2A–4.2B, with the corresponding earnings management trends in Figures 4.1A–4.1D reveals that the timing of sharp decline in market premium coincides with the occurrence of peak levels of accrual or real activity management activities by ES firms. In particular, both major changes take place in the year immediately preceding the break (i.e., –1Break). Taken together, they provide preliminary evidence that the capital market is not fooled by ES firms' attempts to prolong an earnings string through earnings management. A more formal analysis however requires researchers to directly link the level of earnings management during an earnings string with the magnitude of market response over the same time period, as I turn to next.

[Insert Table 4.4 and Figures 4.2A–4.2B about Here]

4.5.3 Results from Univariate Analysis

Panel A (B) of Table 4.5 reports results from univariate comparisons of mean and median market response to high vs. low AM (RM) activities during an earnings string when the ERC sample is partitioned into the high vs. the low AM (RM) groups, defined as firms whose values of $DACC^{PM}$ ($RDISX^{PM}$) are above vs. below the median value of $DACC^{PM}$ ($RDISX^{PM}$) distribution, respectively.

For the AM-based analysis, all three proxies for market response (*P*, *ΔP* and *Ret*) are on average lower in the high AM group than in the low AM group (i.e., 26.1316 vs. 29.3344; 0.1654 vs. 0.1873; 0.1264 vs. 0.1699; see Panel A). For *P* and *Ret*, the difference in group means is significant at the 1 percent level. Results based on comparisons of median values are even stronger with all three median differences, i.e., –4.4700, –0.0320 and –0.0606, significant at the 1 percent level (see Panel A). In the RM-based analysis on the other hand, both *ΔP* and *Ret* are on average statistically similar across the high RM and the low RM groups. Moreover, the high RM group has significantly larger mean and median values of P than the low RM group (i.e., 28.7369 vs. 26.7301 and 24.8750 vs. 22.5000; see Row 1 of Panel B).

In short, it would appear that the market can more easily identify ES firms' aggressive AM activities. While ES firms in the high AM group are penalized with a substantially discounted market premium during the earnings strings, those undertaking aggressive RM continue to be rewarded with a level of market premium at least on par with that received by firms in the low RM group.

[Insert Table 4.5 about Here]

4.5.4 Results from Multivariate Analysis

Panels A-C of Table 4.6 present the regression results estimated using Equations (4-1), (4-2) and (4-3) over the ERC sample of 759 ES firms (or 5,039 observations), respectively. In each panel, results corresponding to the AM (RM)-based analysis appear in Column 1 (2).

Consistent with findings from the traditional ERC literature, the coefficient estimates on E or ΔE are positive and significant at the 1 percent level in the six ERC regressions, constructed based on the combination of market response proxies (P, ΔP or Ret) and earnings management measures ($DACC^{PM}$ or $RDISX^{PM}$). Of particular interest in Chapter 4 is the incremental ERC received by ES firms in the high AM or the high RM group. The interaction terms involving $DACC^{PM}$ are negative in all three ERC regressions, significant at the conventional levels (i.e., $DACC^{PM}\_H*E$ = –2.4681 and t-stat. = –4.09; $DACC^{PM}\_H*\Delta E$ = –0.2264 and t-stat. = –1.43; $DACC^{PM}\_H*\Delta E$ = –0.2784 and t-stat. = –2.10; see Panels A1, B1 and C1 of Table 4.6). While the interaction term involving

$RDISX^{PM}$ in the Price-Level regression is marginally significant at the 10 percent level (*$RDISX^{PM}$_H*E* = –1.1127 and *t*-stat. = –1.52), the corresponding estimate in the Price-Change or Market-Return regression is not significantly different from zero (see Panels A2, B2 and C2 of Table 4.6).

For a given ERC regression, results on the control variables (other than *Year* dummies) are similar across the AM and RM-based analyses. Among the interaction terms between *E* (or *ΔE*) and each of the three control variables, *EVAR*E* in the Price-Level regression and *Growth*ΔE* in the Market-Return regression are significant in the predicted direction at the 5 percent level. Finally, the coefficient estimate on *BV* or *ΔBV* is positive and significant at the 1 percent level in all six ERC regressions.

[Insert Table 4.6 about Here]

Taken together, these results indicate that ES firms with a high level of AM during an earnings string receive a lower ERC than those with a low level of AM. By comparison, there is only limited evidence linking the intensity of RM during an earnings string with the corresponding market response. These results lend support to the observation made previously based on univariate comparisons and again suggest that the market is able to detect attempts by ES firms to use AM and punish them accordingly, but is far less successful in identifying their RM activities.

4.5.5 Results from Sensitivity Analysis

To ensure that the main results are invariant to my choice of proxies for accrual and real activity management (i.e., *$DACC^{PM}$* or *$RDISX^{PM}$*), I now re-estimate

Equations (4-1), (4-2) and (4-3) using performance-adjusted earnings management measures ($DACC^{PA}$ or $RDISX^{PA}$). Univariate results are qualitatively similar to those reported in Table 4.5. For example, both the mean and median market rewards are higher for the low AM group, compared to the high AM group. The differences in group means (medians) when *P*, *ΔP* and *Ret* are used as a proxy for market response are –4.6819 (–5.7500), –0.0219 (–0.0384) and –0.0519 (–0.0668), respectively, and with the exception of one case, these differences are all significant at the 1 percent level (see Panel A1, Table 4.7). As before, the mean and the median differences of *P* between the high RM and the low RM groups are positive and significant, though those calculated based on *Ret* have now become negative and significant (3.0131 and 4.0000; –0.0421 and –0.0241; see Panel A2, Table 4.7).

The multivariate regression results for the AM-based analysis are somewhat weaker than what I found previously. While the coefficient estimate on the test variable is negative and significant in both the Price-Level and the Market-Return regressions ($DACC^{PA}\_H*E$ = –3.2695 and *t*-stat. = –5.13; $DACC^{PA}\_H*\Delta E$ = –0.3479 and *t*-stat. = –2.40; see Panels B1 and D1, Table 4.7), it is nonetheless not significant in the Price-Change regression ($DACC^{PA}\_H*\Delta E$ = –0.1187 and *t*-stat. = –0.63; see Panel C1, Table 4.7). On the other hand, none of the interaction terms involving $RDISX^{PA}$ and *E* or *ΔE* are significantly different from zero, pointing once again the market's inability to detect RM activities by ES firms (see Panels B2, C2 and D2, Table 4.7).

[Insert Table 4.7 about Here]

I also re-estimate Equations (4-1), (4-2) and (4-3) based on the performance-unadjusted earnings management measures (*DACC* or *RDISX*) and report results in Table 4.8. Results indicate that the mean (median) differences of market rewards between the high AM and the low AM groups when *P*, *ΔP* and *Ret* are used as a proxy for market response are –2.5714, –0.0525 and –0.0629 (–3.4400, –0.0411 and –0.0553), respectively, all significant at the 1 percent level (see Panel A1, Table 4.8). The univariate comparisons based on *RDISX*, appearing in Panel A2 of Table 4.8, yield mixed results. While the mean (median) value of *P* is significantly larger in the high RM group than in the low RM group, i.e., 28.4302 vs. 27.0367 (24.1250 vs. 23.1250), the converse is true for *Ret*, i.e., 0.1230 vs. 0.1733 (0.0252 vs. 0.0606).

Moving to the multivatiate analysis, I find that the incremental ERCs on the high AM group are all negative and significant at the 5 percent level or better (i.e., *DACC_H*E* = –2.9289 and *t*-stat. = –4.31; *DACC_H*ΔE* = –0.2404 and *t*-stat. = –1.83; *DACC_H*ΔE* = –0.3249 and *t*-stat. = –2.91; see Panels B1, C1 and D1, Table 4.8). In contrast, the incremental ERC on the high RM group is significantly negative in the Price-Level regression (i.e., *RDISX_H*E* = –1.6190 and *t*-stat. = –1.58; see Panel B2, Table 4.8), but positive and significant in the Price-Change and Market-Return regressions (i.e., *RDISX_H*ΔE* = 0.2967 and *t*-stat. = 2.22; *RDISX_H *ΔE* = 0.2394 and *t*-stat. = 1.88; see Panels C2 and D2, Table 4.8).

[Insert Table 4.8 about Here]

These results suggest that my earlier findings that the capital market recognizes ES firms' attempts to sustain an earnings string through the use of AM, but not RM, are not sensitive to the choice of proxies for AM and RM.

4.6 FURTHER ANALYSIS

Up till now, I have defined the high vs. the low AM (RM) groups based on the median value of AM (RM) distribution. In this section, I conduct further analysis by dividing the ERC sample of 759 firms (or 5,039 observations) into three groups, where firms whose values of $DACC^{PM}$ ($RDISX^{PM}$) fall in the top-third of the $DACC^{PM}$ ($RDISX^{PM}$) distribution are labelled as the high AM (RM) group and those in the middle- and bottom-third of the $DACC^{PM}$ ($RDISX^{PM}$) distribution are referred to as the moderate and the low AM (RM) groups, respectively. The purpose of this analysis is to shed additional light on the market's ability (inability) to identify AM (RM) activities. In particular, can the market distinguish among ES firms that have undertaken high vs. moderate vs. low levels of AM? As well, it is possible that partitioning firms into two groups as I did previously may not have provided enough contrast among firms of varying degrees of RM, especially given the perception that RM is relatively more difficult for the market to detect.

Univariate results, appearing in Panel A1 of Table 4.9, indicate that firms in the high AM group have significantly lower mean (median) *P* than those in the moderate and the low AM groups. The mean (median) differences are –4.8889 and –3.7863 (–6.2813 and –5.0000), respectively, significant at the 1 percent level (see Row 1 of Panel A1, Table 4.9). Moreover, firms in the high and the moderate AM groups on average have significantly lower *ΔP* and *Ret*, compared to those in the low AM group (*ΔP*: 0.1672 vs. 0.1537 vs. 0.2081; *Ret*: 0.1265 vs. 0.1220 vs. 0.1960; see Rows 2 and 3 of Panel A1, Table 4.9). Results based on the three RM groups are less clear-cut. The low RM group has significantly smaller mean value of *P* than the other two groups (28.6369 vs. 28.1327 vs. 26.4310; see Row 1 of Panel A2, Table 4.9), but has the largest mean value of *Ret* (0.1290 vs. 0.1399 vs. 0.1756; see Row 3 of Panel A2, Table 4.9).

I next re-estimate Equations (4-1), (4-2) and (4-3) by including an additional test variable to represent the incremental ERC for firms with a moderate level of earnings management activities. The revised ERC models are summarized in Equations (4-4), (4-5) and (4-6) below:

$$\begin{aligned} P_{it} = {} & \beta_0 + \beta_1 E_{it} + \beta_2 DACC^{PM}\_H * E_{it} \text{ (or } \beta_2 RDISX^{PM}\_H * E_{it}) \\ & + \beta_3 DACC^{PM}\_M * E_{it} \text{ (or } \beta_3 RDISX^{PM}\_M * E_{it}) + \beta_4 Growth_{it} * E_{it} \\ & + \beta_5 EVAR_{it} * E_{it} + \beta_6 DE_{it} * E_{it} + \beta_7 BV_{it} \\ & + \beta_t YearDummy + \beta_t YearDummy * E_{it} + \varepsilon_{it} \end{aligned} \quad (4\text{-}4)$$

$$\begin{aligned} \Delta P_{it} = {} & \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC^{PM}\_H * \Delta E_{it} \text{(or } \beta_2 RDISX^{PM}\_H * \Delta E_{it}) \\ & + \beta_3 DACC^{PM}\_M * \Delta E_{it} \text{(or } \beta_3 RDISX^{PM}\_M * \Delta E_{it}) + \beta_4 Growth_{it} * \Delta E_{it} \\ & + \beta_5 EVAR_{it} * \Delta E_{it} + \beta_6 DE_{it} * \Delta E_{it} + \beta_7 \Delta BV_{it} \\ & + \beta_t YearDummy + \beta_t YearDummy * \Delta E_{it} + \varepsilon_{it} \end{aligned} \quad (4\text{-}5)$$

$$\begin{aligned} Ret_{it} = {} & \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC^{PM}\_H * \Delta E_{it} \text{(or } \beta_2 RDISX^{PM}\_H * \Delta E_{it}) \\ & + \beta_3 DACC^{PM}\_M * \Delta E_{it} \text{(or } \beta_3 RDISX^{PM}\_M * \Delta E_{it}) + \beta_4 Growth_{it} * \Delta E_{it} \\ & + \beta_5 EVAR_{it} * \Delta E_{it} + \beta_6 DE_{it} * \Delta E_{it} + \beta_7 \Delta BV_{it} \end{aligned} \quad (4\text{-}6)$$

$+ \beta_t YearDummy + \beta_t YearDummy^{*}\Delta E_{it} + \varepsilon_{it}$

The first test variable in Equation (4-4), $DACC^{PM}\_H^{*}E$ (or $RDISX^{PM}\_H^{*}E$), represents the interaction between E and an indicator variable set equal to one if an observation's $DACC^{PM}$ ($RDISX^{PM}$) falls in the top-third of $DACC^{PM}$ ($RDISX^{PM}$) distribution; the second test variable, $DACC^{PM}\_M^{*}E$ (or $RDISX^{PM}\_M^{*}E$), denotes the interaction between E and an indicator variable that is equal to one if an observation's $DACC^{PM}$ ($RDISX^{PM}$) falls in the middle-third of $DACC^{PM}$ ($RDISX^{PM}$) distribution. The interaction terms in Equations (4-5) and (4-6), i.e., $DACC^{PM}\_H^{*}\Delta E$ (or $RDISX^{PM}\_H^{*}\Delta E$) and $DACC^{PM}\_M^{*}\Delta E$ (or $RDISX^{PM}\_M^{*}\Delta E$), can be defined analogously. In each ERC model, the reference group is given by firms in the bottom-third of $DACC^{PM}$ or $RDISX^{PM}$ distribution. All other model variables are as defined in Section 4.4.

Focusing first on the AM-based analysis, reported in Panels B1, C1 and D1 of Table 4.9, I find that the coefficient estimates on the first test variable are all negative and significant at the 5 percent level or better ($DACC^{PM}\_H^{*}E$ = –3.1017 and *t*-stat. = –4.04; $DACC^{PM}\_H^{*}\Delta E$ = –0.3055 and *t*-stat. = –1.77; $DACC^{PM}\_H^{*}\Delta E$ = –0.3446 and *t*-stat. = –2.30). The corresponding estimate on the second test variable is significantly negative in the Price-Level and Price-Change regressions, but insignificantly different from zero in the Market-Return regression ($DACC^{PM}\_M^{*}E$ = –1.7554 and *t*-stat. = –2.31; $DACC^{PM}\_M^{*}\Delta E$ = –0.3954 and *t*-stat. = –1.64; $DACC^{PM}\_M^{*}\Delta E$ = –0.2503 and *t*-stat. = –1.10). More importantly, for two of the ERC regressions the coefficient estimate on the high AM group is more negative with stronger *t*-statistics than that on the moderate

AM group, implying a smallest market premium awarded to firms suspected to have undertaken the most aggressive AM activities.

In the RM-based analysis, both the high and the moderate RM groups have a negative incremental ERC in the Price-Level regression, with the magnitude of the coefficient estimates and associated *t*-statistics relatively stronger for the moderate RM group ($RDISX^{PM}\_H*E$ = –1.3712 and *t*-stat. = –1.40; $RDISX^{PM}\_M*E$ = –1.9243 and *t*-stat. = –2.15; see Panel B2, Table 4.9). In the remaining two ERC regressions, the coefficients on $RDISX^{PM}\_H*\Delta E$ are insignificant, whereas those on $RDISX^{PM}\_M*\Delta E$ are positive and significant, implying that ES firms with moderate RM receive a higher market premium than those in not just the low RM group, but also the high RM group (see Panels C2 and D2, Table 4.9).

[Insert Table 4.9 about Here]

In summary, partitioning the sample into three subsets reveals some new insights. Specifically, the capital market appears to be capable of distinguishing firms with high vs. moderate vs. low levels of accrual management. Market rewards received by ES firms during an earnings string are generally inversely related to the extent of accrual management over the same time period. By comparison, I find mixed patterns linking the level of real activity management with the magnitude of market response.

4.7 CONCLUSION

In Chapter 4, I have examined the questions of whether the capital market can detect earnings management by firms with a string of consecutive earnings increases for at least five years (ES firms) to sustain an earnings string and if the market reacts to accrual management (AM) and real activity management (RM) differently. Results indicate that market rewards are significantly smaller when the level of accrual management undertaken by ES firms is high, compared to when it is low. On the other hand, no discernible patterns can be identified from linking the level of real activity management with market response. These results are invariant to the choice of proxies for market response (Price-Level, Price-Change or Market-Return), the measures of earnings management (performance-matched, performance-adjusted or performance-unadjusted) or the basis for partitioning the sample (median or tercile values). Taken together, they suggest that the market has the ability to identify AM activities undertaken by ES firms and discounts rewards given to ES firms accordingly. But, RM is relatively more difficult for the market to detect, as evidenced in mostly similar levels of rewards received by ES firms with varying degrees of real activity management.

As a direction for future research, it would be interesting to see whether different market participants would respond to ES firms' earnings management, and in particular real activity management, differently depending on their level of sophistication. It may also be worthwhile to take a closer look at the characteristics of ES firms that resort to AM vs. RM. Such an analysis could help the market overcome the difficulties of identifying RM. An implication from Chapter 4 is that profitable trading strategy may be formed based on the level of AM during the earnings string. The research question is of practical relevance, though may be challenging to analyze as firms may undertake a similar or different level of AM and/or RM in years after the current earnings string has ended.

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Appendix 4-I
Definitions & Measurements of Variables in Chapter 4

Variables	**Definitions & Measurements**
Market Response Regression Models: Main Analysis (See Equations (4-1), (4-2), and (4-3))	
P	Stock price per share three months after the fiscal yearend (i.e., stock price at the end of fourth month after the fiscal year).
ΔP	Change in stock price scaled by stock price at the end of previous year (i.e. stock price three months after the previous fiscal yearend), $(P_t - P_{t-1}) / P_{t-1}$.
Ret	Market-adjusted return (a firm's compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend minus the compound annual return of value-weighted market index over the same 12-month period).
E	Earnings per share excluding extraordinary items.
ΔE	Change in earnings per share scaled by stock price at the end of previous year, $(EPS_t - EPS_{t-1}) / P_{t-1}$.
$DACC^{PM}\_H$	= 1, if a firm's $DACC^{PM}$ is above the median of $DACC^{PM}$ distribution; = 0 otherwise; $DACC^{PM}$ represents performance-matched discretionary accruals, defined as the difference between an ES firm *i*'s discretionary accruals and those of a non-ES firm that has the closest *ROA* (return on assets, defined as net income deflated by opening assets) within the same two-digit SIC industry-year group.
$RDISX^{PM}\_H$	= 1, if a firm's $RDISX^{PM}$ is above the median of $RDISX^{PM}$ distribution; = 0otherwise; $RDISX^{PM}$ represents performance-matched abnormal discretionary expenses multiplied by −1, calculated as −1 times the difference between an ES firm *i*'s abnormal discretionary expenses and those of a non-ES firm that has the closest *ROA* within the same two-digit SIC industry-year group.
Growth	Five-year compounded annual growth rate of book value of equity, $(BVE_t / BVE_{t-5})^{1/5}$.
EVAR	Variance of the past six years' percentage change in earnings, where the percentage of change in earnings is $(EPS_t - EPS_{t-1})$ / abs EPS_{t-1}.
DE	Debt-to-equity ratio, (current debt + long-term debt)/shareholder's equity.
BV	Book value of equity per share.
Δ*BV*	Change in book value of equity per share (*BV*) scaled by stock price at the end of previous year, $(BV_t - BV_{t-1}) / P_{t-1}$.
YearDummy	19 dummies for fiscal year.

(The appendix is continued on the next page.)

Appendix 4-I (Continued)

Variables	Definitions & Measurements
Accrual Management Estimation Model (See Equation (4-A1) in Appendix 4-II)	
TAC	Total accruals (income before extraordinary items minus cash flow from operations).
TA	Total assets.
ΔS	Change in sales.
Δ*REC*	Change in account receivables from trade.
k	Estimated slope coefficient from a regression of Δ*REC/TA* on *ΔS/TA* for each two-digit SIC industry-year group.
PPE	Property, Plant & Equipment (Gross).
S	Sales (net).
DACC	Discretionary accruals, residuals estimated from the forward-looking modified-Jones model.
Real Management Estimation Model (See Equation (4-A2) in Appendix 4-III)	
DIS	Discretionary expenses; the sum of advertising, R&D (research & development), and SG&A expenses (selling, general & administration expenses); at least one of these three expenses is available, other remaining expenses are set to zero if they are missing.
DISX	Abnormal discretionary expenses; residuals estimated from the normal discretionary expense regression based on Roychowdhury (2006).

(The appendix is continued on the next page.)

Appendix 4-I (Continued)

Variables	Definitions & Measurements
Consistency Check Model (See Equations (4-A3) and (4-A4) in Appendix 4-IV)	
$DACC^{PM}$	Performance-matched discretionary accruals, defined as before.
$DACC^{PA}$	Performance-adjusted discretionary accruals, defined as the difference between an ES firm *i*'s discretionary accruals and the median discretionary accruals of the *ROA* decile within the same two-digit SIC industry-year group.
DACC	Discretionary accruals (i.e., residuals) estimated from the forward-looking modified-Jones model.
MidES	= 1, if a firm-year observation falls in the period from the third year of an earnings string to three years before the break of an earnings string; = 0 otherwise.
−2Break	= 1, if a firm-year observation falls in two years before the break of an earnings string; = 0 otherwise.
−1Break	= 1, if a firm-year observation falls in one year before the break of an earnings string; = 0 otherwise.
Break	= 1, if a firm-year observation falls in the break year of an earnings string; = 0 otherwise.
Size	Natural logarithm of market value of equity at the beginning of the fiscal year.
BTM	Book-to-market ratio at the beginning of the fiscal year.
Leverage	Total debts at the beginning of the fiscal year scaled by opening total assets.
CFO	Cash flow from operations scaled by opening total assets.
Loss	= 1, if a firm reports a net loss in the previous year; = 0 otherwise.
NewIssue	= 1, if a firm issues new equity in the current period; = 0 otherwise.
Litigation	= 1, if a firm's business belongs to the following industries; = 0 otherwise. Biotechnology (SIC 2833–2836, 8731–8734), Computer (SIC 3570–3577, 7370–7374), Electronics (SIC 3600–3674), and Retailing (SIC 5200–5961).
BigN	= 1, if a firm retains a Big-N auditor; = 0 otherwise.
$RDISX^{PM}$	Performance-matched abnormal discretionary expenses multiplied by −1, defined as before.
$RDISX^{PA}$	Performance-adjusted abnormal discretionary expenses multiplied by −1, calculated as −1 times the difference between an ES firm *i*'s abnormal discretionary expenses and the median abnormal discretionary expenses of the *ROA* decile within the same two-digit SIC industry-year group.
RDISX	Abnormal discretionary expenses multiplied by −1, defined as −1 times the residuals from the normal discretionary expense regression in Roychowdhury (2006).

(The appendix is continued on the next page.)

Appendix 4-I (Continued)

Variables	**Definitions & Measurements**
Market Response Regression Models: Sensitivity Analysis 1	
$DACC^{PA}\_H$	= 1, if a firm's $DACC^{PA}$ is above the median of $DACC^{PA}$ distribution; = 0 otherwise.
$RDISX^{PA}\_H$	= 1, if a firm's $RDISX^{PA}$ is above the median of $RDISX^{PA}$ distribution; = 0 otherwise.
Market Response Regression Models: Sensitivity Analysis 2	
DACC_H	= 1, if a firm's *DACC* is above the median of *DACC* distribution; = 0 otherwise.
RDISX_H	= 1, if a firm's *RDISX* is above the median of *RDISX* distribution; = 0 otherwise.
Market Response Regression Models: Further Analysis (See Equations (4-4), (4-5) & (4-6))	
$DACC^{PM}\_H$	= 1, if a firm's $DACC^{PM}$ falls in the top-third of $DACC^{PM}$ distribution; = 0 otherwise.
$DACC^{PM}\_M$	= 1, if a firm's $DACC^{PM}$ falls in the middle-third of $DACC^{PM}$ distribution; = 0 otherwise.
$RDISX^{PM}\_H$	= 1, if a firm's $RDISX^{PM}$ falls in the top-third of $RDISX^{PM}$ distribution; = 0 otherwise.
$RDISX^{PM}\_M$	= 1, if a firm's $RDISX^{PM}$ falls in the middle-third of $RDISX^{PM}$ distribution; = 0 otherwise.

Appendix 4-II
Estimation of Discretionary Accruals

To calculate discretionary accruals, I follow Dechow, Richardson and Tuna (2003) and estimate the following forward-looking modified-Jones model cross-sectionally for every two-digit SIC industry-year group with at least 20 observations over 1989–2007:

$$\frac{TAC_{it}}{TA_{it-1}} = \alpha_1 \frac{1}{TA_{it-1}} + \alpha_2 \frac{(1+k)\Delta S_{it} - \Delta REC_{it}}{TA_{it-1}} + \alpha_3 \frac{PPE_{it}}{TA_{it-1}} + \alpha_4 \frac{TAC_{it-1}}{TA_{it-2}} + \alpha_5 \frac{\Delta S_{it+1}}{S_{it}} + \varepsilon_{i.t} \quad \text{(4-A1)}$$

All variables are winsorized at the top and bottom 1 percent of their respective distributions. Consistent with prior research (Kothari, Leone and Wasley 2005), an observation is deleted if its absolute value of total accruals deflated by opening total assets is greater than one. The residuals represent discretionary accruals (denoted as *DACC*).

A summary of the mean value of each estimated coefficient across 701 industry-years, along with *t*-statistics calculated using the standard error of the mean across 701 industry-years, is presented below. The adjusted R^2 is the mean adjusted R^2 over 701 industry-years.

	Mean Value of Estimated Coefficient (*t*-statistics)
$\frac{1}{TA_{it-1}}$	−0.1497 (−4.03)***
$\frac{(1+k)\Delta S_{it} - \Delta REC_{it}}{TA_{it-1}}$	0.0228 (7.05)***
$\frac{PPE_{it}}{TA_{it-1}}$	−0.0679 (−45.15)***
$\frac{TAC_{it-1}}{TA_{it-2}}$	0.1791 (20.52)***
$\frac{\Delta S_{it+1}}{S_{it}}$	0.0292 (7.72)***
Mean Adjusted R^2 (in %) = 39.03%	

Note 1: The model is based on Dechow, Richardson and Tuna (2003).
Note 2: ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).

Please refer to **Appendix 4-I** for variable definitions and measurements.

Appendix 4-III
Estimation of Abnormal Discretionary Expenses

To calculate abnormal discretionary expenses, I follow Roychowdhury (2006) and estimate the following regression model cross-sectionally for every two-digit SIC industry-year group with at least 20 observations over 1988–2008:

$$\frac{DIS_{it}}{TA_{it-1}} = \alpha_0 + \alpha_1 \frac{1}{TA_{it-1}} + \alpha_2 \frac{S_{it-1}}{TA_{it-1}} + \varepsilon_{it} \quad \text{(4-A2)}$$

All variables are winsorized at the top and bottom 1 percent of their respective distributions. The residuals represent abnormal discretionary expenses (denoted as *DISX*).

A summary of the mean value of each estimated coefficient across 821 industry-years, along with *t*-statistics calculated using the standard error of the mean across 821 industry-years, is presented below. The adjusted R^2 is the mean adjusted R^2 over 821 industry-years.

	Mean Value of Estimated Coefficient (*t*-statistics)
Intercept	0.1652 (22.61)***
$\frac{1}{TA_{it-1}}$	1.4923 (17.20)***
$\frac{S_{it-1}}{TA_{it-1}}$	0.1255 (24.14)***
Mean Adjusted R^2 (in %) = 40.18%	

Note 1: The model is based on Roychowdhury (2006).
Note 2: ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively (for two-tailed test).

Please refer to **Appendix 4-I** for variable definitions and measurements.

Appendix 4-IV
Consistency Check with Chapters 2 and 3

AM Model:

$$
\begin{aligned}
Y_{it} = {} & \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet -2Break_{it} + \beta_3 \bullet -1Break_{it} + \beta_4 \bullet Break_{it} \\
& + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} \\
& + \gamma_5 \bullet Loss_{it-1} + \gamma_6 \bullet NewIssue_{it} + \gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it} \\
& + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}
\end{aligned}
\tag{4-A3}
$$

where the dependent variable, Y_{it}, is given by three AM proxies: performance-matched discretionary accruals ($DACC^{PM}$), performance-adjusted discretionary accruals ($DACC^{PA}$) and performance-unadjusted discretionary accruals (*DACC*); the reference group is the first two years of an earnings string; $MidES_{it}$ is set equal to one if a firm-year observation falls in the period from the third year of an earnings string to three years before the break and zero otherwise; $-2Break_{it}$ and $-1Break_{it}$, are defined as the second last and the last year of an earnings string, respectively; $Break_{it}$, is set equal to one if a firm-year observation falls in the break year and zero otherwise. Control variables are firm size ($Size_{it-1}$), measured as log transformation of opening market value of equity; book-to-market ratio (BTM_{it-1}), defined as book value over market value of equity at the beginning of the year; debt-to-asset ratio ($Leverage_{it-1}$); cash flows from operations scaled by opening total assets (CFO_{it}); prior year loss ($Loss_{it-1}$), taking on a value of one if the firm reports a net loss in the previous year and zero otherwise; new equity issues ($NewIssue_{it}$), set equal to one if a firm raises capital in the current period and zero otherwise; litigation risks ($Litigation_{it}$), taking on a value of one if the firm belongs to the following high-risk industries: Biotechnology (SIC 2833–2836 and SIC 8731–8734), Computer (SIC 3570–3577 and 7370–7374), Electronics (SIC 3600–3674) and Retailing (SIC 5200–5961); audit quality ($BigN_{it}$), set equal to one if the firm retains a Big-N auditor and zero otherwise; and *IndustryDummy* and *YearDummy* variables to control for the potential industry and year effects.

RM Model:

$$
\begin{aligned}
Y_{it} = {} & \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet -2Break_{it} + \beta_3 \bullet -1Break_{it} + \beta_4 \bullet Break_{it} \\
& + \gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet NewIssue_{it} \\
& + \gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}
\end{aligned}
\tag{4-A4}
$$

where the dependent variable, Y_{it}, is given by three RM proxies: performance-matched abnormal discretionary expenses multiplied by -1 ($RDISX^{PM}$), performance-adjusted abnormal discretionary expenses multiplied by -1 ($RDISX^{PA}$) and performance-unadjusted abnormal discretionary expenses multiplied by -1 (*RDISX*). All the test and control variables are as defined in Equation (4-A3).

Please refer to **Appendix 4-I** for variable definitions and measurements.

TABLE 4.1
Sample and Data

Panel A: Sample Selection Procedure for the ES Sample

	Number of Earnings Strings	Number of Observations
Total number of earnings strings (ES)/observations collected from COMPUSTAT Fundamental Annual Database (1989–2007)	1,295	8,022
Less: Final year of earnings strings fell in 2007	(302)	(1,932)
Less: Missing data in the break year	(143)	(857)
Number of earnings strings/observations with clearly identifiable break year (excluding the break year)	850	5,233
Number of observations in the break year		850
The ES sample (1989–2007)	850	6,083

Note 1: An earnings string (ES) is defined as a string of increasing EPS for at least five years.
Note 2: While the break year is not a part of an earning string, it is included in the ES sample for analysis.

Panel B: Composition of the ES Sample (1989–2007)

	N	%
Number of first strings	810	95.29%
Number of second strings	40	4.71%
Total number of earnings strings	850	100.00%
Number of distinct firms with one earnings string	770	95.06%
Number of distinct firms with two earnings strings	40	4.94%
Total number of distinct ES sample firms	810	100.00%

(The table is continued on the next page.)

TABLE 4.1 (Continued)

Panel C: The ERC Sample

	Number of Firms	Number of Observations
(1) The ES sample[1]	810	6,083
(2) The ERC Sample[2]		
Data collected from the COMPUSTAT Fundamental Annual Database and the CRSP Monthly Stock Database in order to meet requirements of the three ERC regressions	759	5,039

Note 1: Observations of the ES sample (6,083 observations or 810 firms) have all data requirements in both Chapters 2 and 3. Among 810 firms, 770 firms have only one earnings string while 40 firms have two earnings strings. Thus, the total number of earnings strings is 850 (770 + 40 * 2 = 850) while the total number of firms is 810.
Note 2: Data for the three ERC regressions are collected from the COMPUSTAT Fundamental Annual Database and the CRSP Monthly Stock Database (stock price and return related data) based on the ES sample. Among 6,083 observations (810 firms), only 5,039 observations (equivalently 759 firms or 775 earnings strings) meet data requirements of the three ERC regressions.

TABLE 4.2
Consistency Checks with Chapters 2 and 3 (Based on the ERC sample)

Panel A: **Multivariate Results based on the Three AM Measures**

Sample Period: 1989–2007
Model: $Y_{it} = \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet -2Break_{it} + \beta_3 \bullet -1Break_{it} + \beta_4 \bullet Break_{it}$
$+\gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet CFO_{it} + \gamma_5 \bullet Loss_{it-1}$
$+\gamma_6 \bullet NewIssue_{it} + \gamma_7 \bullet Litigation_{it} + \gamma_8 \bullet BigN_{it}$
$+\gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$

Y_{it}		(1). $DACC^{PM}$			(2). $DACC^{PA}$			(3). *DACC*		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
Test Variable										
MidES	?	0.0079	1.42	0.1547	0.0039	1.30	0.1945	0.0069	2.22	0.0268
−2Break	+	0.0150	2.28	0.0115	0.0150	4.12	<.0001	0.0176	4.42	<.0001
−1Break	+	0.0188	2.81	0.0026	0.0288	7.51	<.0001	0.0357	8.59	<.0001
Break	−	−0.0287	−3.77	0.0001	−0.0227	−5.18	<.0001	−0.0239	−4.96	<.0001
Control Variable										
Size		−0.0012	−0.93	0.3529	−0.0027	−3.09	0.0020	−0.0014	−1.60	0.1108
BTM		−0.0075	−1.14	0.2532	−0.0150	−3.23	0.0013	−0.0076	−1.55	0.1217
Leverage		−0.0330	−2.63	0.0088	−0.0490	−5.46	<.0001	−0.0551	−5.55	<.0001
CFO		−0.5015	−18.92	<.0001	−0.4525	−21.68	<.0001	−0.3549	−15.10	<.0001
Loss		−0.0542	−7.50	<.0001	−0.0509	−10.11	<.0001	−0.0738	−12.85	<.0001
NewIssue		−0.0024	−0.54	0.5866	−0.0060	−1.93	0.0545	−0.0064	−2.09	0.0371
Litigation		−0.0123	−1.73	0.0848	−0.0153	−2.95	0.0033	−0.0184	−3.30	0.0010
BigN		0.0035	0.55	0.5806	0.0020	0.40	0.6902	0.0034	0.56	0.5750
Year-Dummy		Yes			Yes			Yes		
Industry-Dummy		Yes			Yes			Yes		
Adj. R^2		18.74%			37.04%			26.68%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

(The table is continued on the next page.)

TABLE 4.2 (Continued)

Panel B: Multivariate Results based on the Three RM Measures

Sample Period: 1989–2007

Model: $Y_{it} = \beta_0 + \beta_1 \bullet MidES_{it} + \beta_2 \bullet -2Break_{it} + \beta_3 \bullet -1Break_{it} + \beta_4 \bullet Break_{it}$

$+\gamma_1 \bullet Size_{it-1} + \gamma_2 \bullet BTM_{it-1} + \gamma_3 \bullet Leverage_{it-1} + \gamma_4 \bullet NewIssue_{it}$

$+\gamma_j \bullet IndustryDummy + \gamma_t \bullet YearDummy + \varepsilon_{it}$

Y_{it}		(1). *RDISX*^{PM}			(2). *RDISX*^{PA}			(3). *RDISX*		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
Test Variable										
MidES	?	0.0385	1.98	0.0482	0.0384	2.95	0.0032	0.0354	2.68	0.0075
−2Break	+	0.0453	1.95	0.0261	0.0340	2.13	0.0167	0.0370	2.43	0.0076
−1Break	+	0.0501	2.13	0.0170	0.0399	2.42	0.0078	0.0497	2.93	0.0018
Break	+/ insignificant	0.0128	0.52	0.3006	0.0215	1.24	0.1075	0.0593	3.28	0.0006
Control Variable										
Size		0.0198	3.17	0.0016	0.0193	3.62	0.0003	0.0267	4.89	<.0001
BTM		0.0931	3.11	0.0020	0.1020	3.93	<.0001	0.1852	6.86	<.0001
Leverage		0.2105	3.53	0.0004	0.1540	2.98	0.0030	0.2908	5.49	<.0001
NewIssue		−0.0231	−1.16	0.2483	−0.0221	−1.23	0.2208	−0.0261	−1.46	0.1436
Year-Dummy		Yes			Yes			Yes		
Industry-Dummy		Yes			Yes			Yes		
Adj. R^2		2.33'%			5.09%			11.74%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

Note 1: All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Note 2: Untabulated results of consistency checks based on the ES sample (6,083 firm-year observations or 810 firms) are similar.

Please refer to **Appendix 4-I** for variable definitions and measurements.

TABLE 4.3
Descriptive Statistics (1989–2007; N = 775 Earnings Strings)

Panel A: <u>Distribution of Model Variables</u>

	Mean	**Std Dev**	**Min**	**25%**	**50%**	**75%**	**Max**	**N**
P	27.7333	20.9516	0.8300	11.6250	23.7500	38.5000	100.7500	5,039
ΔP	0.1763	0.5934	−0.7327	−0.1829	0.0759	0.3733	3.0000	5,039
Ret	0.1482	0.5744	−0.8056	−0.1971	0.0395	0.3563	2.6618	5,039
E	0.6912	0.6367	−1.5000	0.2963	0.6700	1.2400	1.5000	5,039
ΔE	0.0373	0.2124	−1.5000	0.0015	0.0050	0.0139	1.5000	5,039
BV	9.6459	7.7147	0.1856	4.3179	7.8503	12.7119	40.8135	5,039
ΔBV	0.0237	0.1069	−0.4178	−0.0092	0.0392	0.0737	0.3302	5,039
Growth	0.1920	0.2218	−0.2575	0.0600	0.1473	0.2772	1.1119	5,039
EVAR	6.6138	19.8349	0.0000	0.0425	0.2781	2.3329	100.0000	5,039
DE	0.4724	0.6356	0.0000	0.0327	0.2650	0.6374	3.5860	5,039

Note 1: All variables except for *E*, *ΔE*, and *EVAR* (discussed in **Notes 2–3**) are winsorized at the top and bottom 1 percent of the distribution.
Note 2: Both *E* and *ΔE* are winsorized to the minimum value of −1.5 and the maximum value of +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991).
Note 3: Variable *EVAR* is winsorized to 100 (see Barth et al. 1999).

Please refer to **Appendix 4-I** for variable definitions and measurements.

(The table is continued on the next page.)

TABLE 4.3 (Continued)

Panel B: Distribution of Earnings Management Measures

	Mean	Std Dev	Min	25%	50%	75%	Max	N
$DACC^{PM}$	−0.0124	0.1344	−0.8363	−0.0798	−0.0105	0.0533	0.8090	5,039
$RDISX^{PM}$	−0.0003	0.4114	−2.8367	−0.1935	−0.0050	0.1908	3.3165	5,039
$DACC^{PA}$	−0.0052	0.0887	−0.5172	−0.0489	−0.0076	0.0366	0.4747	5,039
$RDISX^{PA}$	−0.0385	0.2822	−3.0027	−0.1513	−0.0062	0.1154	3.0923	5,039
DACC	0.0043	0.0842	−0.6350	−0.0351	0.0027	0.0448	0.4676	5,039
RDISX	0.0251	0.2850	−3.2480	−0.0906	0.0497	0.1874	1.0976	5,039

Note 1: Three AM proxies are $DACC^{PM}$, $DACC^{PA,}$ and *DACC* while three RM proxies are $RDISX^{PM}$, $RDISX^{PA,}$ and *RDISX*. $DACC^{PM}$ and $RDISX^{PM}$ represent performance-matched discretionary accruals, and performance-matched abnormal discretionary expenses multiplied by − 1; $DACC^{PA}$ and $RDISX^{PA}$ represent performance-adjusted discretionary accruals, and performance-adjusted abnormal discretionary expenses multiplied by −1; *DACC* and *RDISX* represent performance-unadjusted discretionary accruals (residuals estimated from the forward-looking modified-Jones model), and performance-unadjusted abnormal discretionary expenses (residuals estimated from the normal discretionary expense regression in Roychowdhury 2006) multiplied by −1.

Please refer to **Appendix 4-I** for variable definitions and measurements.

TABLE 4.4
Mean and Median Market Response along an Earnings String (1989–2007; N = 775 Earnings Strings)

Five Periods along an Earnings String	(1) *P*		(2) *ΔP*		(3) *Ret*		*N*
	Mean	*Median*	*Mean*	*Median*	*Mean*	*Median*	
Early-ES	23.6201	17.0000	0.3266 ***	0.1934 ***	0.2899 ***	0.1550 ***	1,137
Mid-ES	31.0104	27.0000	0.2267 ***	0.1316 ***	0.2419 ***	0.1174 ***	1,602
−2Break	30.5911	26.4050	0.2621 ***	0.1243 ***	0.2111 ***	0.0913 ***	762
−1Break	27.0777	23.1250	−0.0070	−0.0588 ***	−0.0517 ***	−0.1256 ***	775
Break	24.7940	19.8750	−0.0529 ***	−0.1101 ***	−0.1195 ***	−0.1652 ***	763
Total N							5,039

Note 1: This table shows the mean and median values of *P*, *ΔP*, and *Ret* of ES firms along the following five sub-periods of an earnings string: Early-ES (the first two years of an earnings string), Mid-ES (the period from the third year of an earnings string to three years before the break), −2Break (two years before the break), −1Break (one year before the break) and Break (the year when an earnings string is broken). The sample period covers from 1989 to 2007.
Note 2: *P* represents stock price three months after the fiscal yearend; *ΔP* is change in price deflated by stock price at the end of previous year; and *Ret* is market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution.
Note 3: ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively, using two-tailed *t*-tests for means and two-tailed sign tests for medians.

Please refer to **Appendix 4-I** for variable definitions and measurements.

TABLE 4.5
Univariate Analysis (1989–2007; N = 775 Earnings Strings)

Panel A: Univariate Results based on *AM* ($DACC^{PM}$)

	Mean			Median			
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	
	High	**Low**	**(1) − (2)**	**High**	**Low**	**(1) − (2)**	**Total N**
P	26.1316	29.3344	−3.2028 ***	21.2800	25.7500	−4.4700 ***	
ΔP	0.1654	0.1873	−0.0219	0.0577	0.0897	−0.0320 ***	
Ret	0.1264	0.1699	−0.0435 ***	0.0128	0.0733	−0.0606 ***	
N	2,519	2,520		2,519	2,520		5,039

Panel B: Univariate Results based on *RM* ($RDISX^{PM}$)

	Mean			Median			
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	
	High	**Low**	**(1) − (2)**	**High**	**Low**	**(1) − (2)**	**Total N**
P	28.7369	26.7301	2.0068 ***	24.8750	22.5000	2.3750 ***	
ΔP	0.1659	0.1868	−0.0209	0.0758	0.0760	−0.0002	
Ret	0.1357	0.1606	−0.0249	0.0351	0.0496	−0.0145	
N	2,519	2,520		2,519	2,520		5,039

Note 1: This table shows the comparison of mean and median values of *P*, *ΔP*, and *Ret* between the high and the low AM (RM) groups. In **Panel A**, a firm is assigned to High (Low) AM group if its $DACC^{PM}$ is above (below) the median of $DACC^{PM}$ distribution. In **Panel B**, a firm is assigned to High (Low) RM group if its $RDISX^{PM}$ is above (below) the median of $RDISX^{PM}$ distribution. $DACC^{PM}$ is the performance-matched discretionary accruals and $RDISX^{PM}$ is the performance-matched abnormal discretionary expenses multiplied by −1.
Note 2: *P* represents stock price three months after the fiscal yearend; *ΔP* is change in price deflated by stock price at the end of previous year; and *Ret* represents market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution.
Note 3: ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively, using two-tailed *t*-tests for means and two-tailed Wilcoxon tests for medians.

TABLE 4.6
Multivariate Analysis

Panel A: **Dependent Variable = Price (*P*)**

Sample Period: 1989–2007
Model: $P_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 DACC^{PM}\_H{*}E_{it}$ (or $\beta_2 RDISX^{PM}\_H{*}E_{it}$) $+ \beta_3 Growth_{it}{*}E_{it}$

$+\beta_4 EVAR_{it}{*}E_{it} + \beta_5 DE_{it}{*}E_{it} + \beta_6 BV_{it} + \beta_t YearDummy$

$+ \beta_t YearDummy{*}E_{it} + \varepsilon_{it}$

		Panel A1. EM=*DACC*^{PM}			**Panel A2. EM=*RDISX*^{PM}**		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
E	+	10.7318	4.78	<.0001	10.0879	4.45	<.0001
Test Variable							
DACC*^{PM}*_H*E	−	−2.4681	−4.09	<.0001	n/a	n/a	n/a
RDISX*^{PM}*_H*E	−	n/a	n/a	n/a	−1.1127	−1.52	0.0647
Control Variable							
Growth*E	+	0.6873	0.31	0.3772	1.0201	0.47	0.3195
EVAR*E	−	−0.0523	−1.75	0.0404	−0.0513	−1.71	0.0441
DE*E	−	0.4963	0.64	0.2605	0.5050	0.64	0.2599
BV	+	1.3462	16.37	<.0001	1.3468	16.34	<.0001
YearDummy			Yes			Yes	
YearDummy*E			Yes			Yes	
Adjusted R^2			41.09%			40.85%	
N			5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)	

(The table is continued on the next page.)

TABLE 4.6 (Continued)

Panel B: Dependent Variable = Changes in Price (*ΔP*)

Sample Period: 1989–2007

Model: $\Delta P_{it} = \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC^{PM}\_H * \Delta E_{it}$ (or $\beta_2 RDISX^{PM}\_H * \Delta E_{it}$)

$+ \beta_3 Growth_{it} * \Delta E_{it} + \beta_4 EVAR_{it} * \Delta E_{it} + \beta_5 DE_{it} * \Delta E_{it} + \beta_6 \Delta BV_{it}$

$+ \beta_t YearDummy + \beta_t YearDummy * \Delta E_{it} + \varepsilon_{it}$

		Panel B1. EM=*DACC*^{PM}			Panel B2. EM=*RDISX*^{PM}		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
ΔE	+	2.3490	2.96	0.0016	2.2571	2.98	0.0015
Test Variable							
DACC^{PM}_H*ΔE	−	−0.2264	−1.43	0.0761	n/a	n/a	n/a
RDISX^{PM}_H*ΔE	−	n/a	n/a	n/a	−0.0184	−0.13	0.4493
Control Variable							
Growth*ΔE	+	0.2370	0.97	0.1658	0.2568	1.07	0.1429
EVAR*ΔE	−	0.0037	1.33	0.0923	0.0036	1.29	0.0982
DE*ΔE	−	−0.0011	−0.01	0.4941	0.0195	0.24	0.4055
ΔBV	+	1.4893	13.46	<.0001	1.4922	13.36	<.0001
YearDummy			Yes			Yes	
YearDummy*ΔE			Yes			Yes	
Adjusted R^2			16.56%			16.42%	
N			5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)	

(The table is continued on the next page.)

TABLE 4.6 (Continued)

Panel C: Dependent Variable = Market-adjusted Return (*Ret*)

Sample Period: 1989–2007

Model: $Ret_{it} = \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC^{PM}\_H * \Delta E_{it} (\text{or } \beta_2 RDISX^{PM}\_H * \Delta E_{it})$

$+\beta_3 Growth_{it} * \Delta E_{it} + \beta_4 EVAR_{it} * \Delta E_{it} + \beta_5 DE_{it} * \Delta E_{it} + \beta_6 \Delta BV_{it}$

$+\beta_t YearDummy + \beta_t YearDummy * \Delta E_{it} + \varepsilon_{it}$

		Panel C1. EM=$DACC^{PM}$			Panel C2. EM=$RDISX^{PM}$		
	Prediction	Coeff.	*t*-stat	*p*-value	Coeff.	*t*-stat	*p*-value
ΔE	+	2.8008	2.99	0.0015	2.7049	3.06	0.0012
Test Variable							
$DACC^{PM}\_H*\Delta E$	−	−0.2784	−2.10	0.0179	n/a	n/a	n/a
$RDISX^{PM}\_H*\Delta E$	−	n/a	n/a	n/a	−0.0713	−0.53	0.2980
Control Variable							
Growth*ΔE	+	0.5339	2.32	0.0104	0.5609	2.32	0.0102
EVAR*ΔE	−	0.0036	1.63	0.0515	0.0034	1.58	0.0572
DE*ΔE	−	−0.0167	−0.27	0.3930	0.0108	0.16	0.4355
ΔBV	+	0.4149	4.11	<.0001	0.4198	4.11	<.0001
YearDummy		Yes			Yes		
YearDummy*ΔE		Yes			Yes		
Adjusted R^2		9.65%			9.44%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

Note 1: In **Panel A**, *P* represents stock price three months after the fiscal yearend. In **Panel B**, *ΔP* is change in price deflated by stock price at the end of previous year. In **Panel C**, *Ret* is market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution, whereas *E* and *ΔE* are winsorized at −1.5 and +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991). All control variables except for *EVAR* are winsorized at the top and bottom 1 percent of the distribution. Variable *EVAR* is winsorized to 100 (see Barth et al. 1999).
Note 2: In **Panels A–C**, $DACC^{PM}\_H$ (i.e., high AM group) is an indicator variable which is equal to 1 for an observation if its $DACC^{PM}$ is above the median of $DACC^{PM}$ distribution and zero otherwise. On the other hand, $RDISX^{PM}\_H$ (i.e., high RM group) is an indicator variable which is equal to 1 for an observation if its $RDISX^{PM}$ is above the median of $RDISX^{PM}$ distribution and zero otherwise. $DACC^{PM}$ is the performance-matched discretionary accruals and $RDISX^{PM}$ is the performance-matched abnormal discretionary expenses multiplied by −1.
Note 3: In **Panels A–C**, All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 4-I** for variable definitions and measurements.

TABLE 4.7
Sensitivity Analysis 1: Performance-adjusted EM Measures

Panel A1. Univariate Results based on $DACC^{PA}$

	Mean			Median			
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(4)**
	High	**Low**	**(1) − (2)**	**High**	**Low**	**(1) − (2)**	**Total N**
P	25.3919	30.0738	−4.6819***	20.6250	26.3750	−5.7500 ***	
ΔP	0.1654	0.1873	−0.0219	0.0554	0.0937	−0.0384 ***	
Ret	0.1222	0.1741	−0.0519***	0.0070	0.0738	−0.0668 ***	
N	2,519	2,520		2,519	2,520		5,039

Panel A2. Univariate Results based on $RDISX^{PA}$

	Mean			Median			
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(4)**
	High	**Low**	**(1) − (2)**	**High**	**Low**	**(1) − (2)**	**Total N**
P	29.2402	26.2271	3.0131***	25.6250	21.6250	4.0000***	
ΔP	0.1661	0.1865	−0.0204	0.0794	0.0724	0.0070	
Ret	0.1271	0.1692	−0.0421***	0.0316	0.0557	−0.0241*	
N	2,519	2,520		2,519	2,520		5,039

Note 1: Panels A1–A2 show the comparison of mean and median values of *P*, *ΔP*, and *Ret* between the high and the low AM (RM) groups. In **Panel A1**, a firm is assigned to High (Low) AM group if its $DACC^{PA}$ is above (below) the median of $DACC^{PA}$ distribution. In **Panel A2**, a firm is assigned to High (Low) RM group if its $RDISX^{PA}$ is above (below) the median of $RDISX^{PA}$ distribution. $DACC^{PA}$ is the performance-adjusted discretionary accruals and $RDISX^{PA}$ is the performance-adjusted abnormal discretionary expenses multiplied by −1.
Note 2: In **Panels A1–A2**, *P* represents stock price three months after the fiscal yearend; *ΔP* is change in price deflated by stock price at the end of previous year; and *Ret* is market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution.
Note 3: In **Panels A1–A2**, ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively, using two-tailed *t*-tests for means and two-tailed Wilcoxon tests for medians.

(The table is continued on the next page.)

TABLE 4.7 (Continued)

Panel B: Dependent Variable = Price (*P*)

Sample Period: 1989–2007
Model: $P_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 DACC^{PA}\_H*E_{it}$ (or $\beta_2 RDISX^{PA}\_H*E_{it}$) $+ \beta_3 Growth_{it}*E_{it}$ $+\beta_4 EVAR_{it}*E_{it} + \beta_5 DE_{it}*E_{it} + \beta_6 BV_{it}$ $+\beta_t YearDummy + \beta_t YearDummy*E_{it} + \varepsilon_{it}$

		Panel B1. EM=*DACC*^{PA}			**Panel B2. EM=*RDISX*^{PA}**		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
E	+	10.8984	4.90	<.0001	9.9999	4.30	<.0001
Test Variable							
DACC*^{PA}*_H*E	–	−3.2695	−5.13	<.0001	n/a	n/a	n/a
RDISX*^{PA}*_H*E	–	n/a	n/a	n/a	−0.8948	−0.88	0.1886
Adjusted R^2		41.32%			40.83%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

Panel C: Dependent Variable = Changes in Price (*ΔP*)

Sample Period: 1989–2007
Model: $\Delta P_{it} =$
$\beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC^{PA}\_H*\Delta E_{it}$(or $\beta_2 RDISX^{PA}\_H*\Delta E_{it}$) $+ \beta_3 Growth_{it}*\Delta E_{it}$ $+\beta_4 EVAR_{it}*\Delta E_{it} + \beta_5 DE_{it}*\Delta E_{it} + \beta_6 \Delta BV_{it} + \beta_t YearDummy$ $+ \beta_t YearDummy*\Delta E_{it} + \varepsilon_{it}$

		Panel C1. EM=*DACC*^{PA}			**Panel C2. EM=*RDISX*^{PA}**		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
ΔE	+	2.3078	2.97	0.0015	2.1521	2.74	0.0032
Test Variable							
DACC*^{PA}*_H*ΔE	–	−0.1187	−0.63	0.2652	n/a	n/a	n/a
RDISX*^{PA}*_H*ΔE	–	n/a	n/a	n/a	0.1586	1.18	0.1192
Adjusted R^2		16.46%			16.49%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

(The table is continued on the next page.)

TABLE 4.7 (Continued)

Panel D: <u>Dependent Variable = Market-adjusted Return (*Ret*)</u>

Sample Period: 1989–2007

Model: $Ret_{it} = \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC^{PA}\_H * \Delta E_{it}$ (or $\beta_2 RDISX^{PA}\_H * \Delta E_{it}$)

$+ \beta_3 Growth_{it} * \Delta E_{it} + \beta_4 EVAR_{it} * \Delta E_{it} + \beta_5 DE_{it} * \Delta E_{it} + \beta_6 \Delta BV_{it}$

$+ \beta_t YearDummy + \beta_t YearDummy * \Delta E_{it} + \varepsilon_{it}$

		Panel D1. EM=*DACC^PA^*			**Panel D2. EM=*RDISX^PA^***		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
ΔE	+	2.8472	3.03	0.0013	2.6815	3.02	0.0013
<u>Test Variable</u>							
$DACC^{PA}$_H*ΔE	−	−0.3479	−2.40	0.0083	n/a	n/a	n/a
$RDISX^{PA}$_H*ΔE	−	n/a	n/a	n/a	−0.0028	−0.02	0.4913
Adjusted R^2		9.73%			9.43%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

Note 1: In **Panel B**, *P* represents stock price three months after the fiscal yearend. In **Panel C**, *ΔP* is change in price deflated by stock price at the end of previous year. In **Panel D**, *Ret* is market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution, whereas *E* and *ΔE* are winsorized at −1.5 and +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991). All control variables except for *EVAR* are winsorized at the top and bottom 1 percent of the distribution. Variable *EVAR* is winsorized to 100 (see Barth et al. 1999).

Note 2: In **Panels B–D**, $DACC^{PA}\_H$ (i.e., high AM group) is an indicator variable which is equal to 1 for an observation if its $DACC^{PA}$ is above the median of $DACC^{PA}$ distribution and zero otherwise. On the other hand, $RDISX^{PA}\_H$ (i.e., high RM group) is an indicator variable which is equal to 1 for an observation if its $RDISX^{PA}$ is above the median of $RDISX^{PA}$ distribution and zero otherwise. $DACC^{PA}$ is the performance-adjusted discretionary accruals and $RDISX^{PA}$ is the performance-adjusted abnormal discretionary expenses multiplied by −1.

Note 3: In **Panels B–D**, results on control variables are not reported to conserve space. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 4-I** for variable definitions and measurements.

TABLE 4.8
Sensitivity Analysis 2: Performance-unadjusted EM Measures

Panel A1. Univariate Results based on *DACC*

	Mean				Median				
	(1)	**(2)**	**(3)**		**(1)**	**(2)**	**(3)**		**(4)**
	High	**Low**	**(1) − (2)**		**High**	**Low**	**(1) − (2)**		**Total N**
P	26.4474	29.0188	−2.5714	***	21.7500	25.1900	−3.4400	***	
ΔP	0.1500	0.2026	−0.0525	***	0.0546	0.0957	−0.0411	***	
Ret	0.1167	0.1796	−0.0629	***	0.0121	0.0674	−0.0553	***	
N	2,519	2,520			2,519	2,520			5,039

Panel A2. Univariate Results based on *RDISX*

	Mean				Median				
	(1)	**(2)**	**(3)**		**(1)**	**(2)**	**(3)**		**(4)**
	High	**Low**	**(1) − (2)**		**High**	**Low**	**(1) − (2)**		**Total N**
P	28.4302	27.0367	1.3935	**	24.1250	23.1250	1.0000	**	
ΔP	0.1618	0.1908	−0.0290	*	0.0728	0.0776	−0.0049		
Ret	0.1230	0.1733	−0.0503	***	0.0252	0.0606	−0.0354	***	
N	2,519	2,520			2,519	2,520			5,039

Note 1: Panels A1–A2 show the comparison of mean and median values of *P*, *ΔP*, and *Ret* between the high and the low AM (RM) groups. In **Panel A1**, a firm is assigned to High (Low) AM group if its *DACC* is above (below) the median of *DACC* distribution. In **Panel A2**, a firm is assigned to High (Low) RM group if its *RDISX* is above (below) the median of *RDISX* distribution. *DACC* is the performance-unadjusted discretionary accruals and *RDISX* is the performance-unadjusted abnormal discretionary expenses multiplied by −1.
Note 2: In **Panels A1–A2**, *P* represents stock price three months after the fiscal yearend; *ΔP* is change in price deflated by stock price at the end of previous year; and *Ret* is market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution.
Note 3: In **Panels A1–A2**, ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively, using two-tailed *t*-tests for means and two-tailed Wilcoxon tests for medians.

(The table is continued on the next page.)

TABLE 4.8 (Continued)

Panel B: Dependent Variable = Price (*P*)

Sample Period: 1989–2007

Model: $P_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 DACC\_H * E_{it}$ (or $\beta_2 RDISX\_H * E_{it}$) $+ \beta_3 Growth_{it} * E_{it} + \beta_4 EVAR_{it} * E_{it} + \beta_5 DE_{it} * E_{it} + \beta_6 BV_{it} + \beta_t YearDummy + \beta_t YearDummy * E_{it} + \varepsilon_{it}$

		Panel B1. EM=*DACC*			Panel B2. EM=*RDISX*		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
E	+	10.4425	4.78	<.0001	10.4281	4.42	<.0001
Test Variable							
DACC_H*E	−	−2.9289	−4.31	<.0001	n/a	n/a	n/a
RDISX_H*E	−	n/a	n/a	n/a	−1.6190	−1.58	0.0570
Adjusted R^2		41.21%			40.92%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

Panel C: Dependent Variable = Changes in Price (*ΔP*)

Sample Period: 1989–2007

Model: $\Delta P_{it} = \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC\_H * \Delta E_{it}$ (or $\beta_2 RDISX\_H * \Delta E_{it}$) $+ \beta_3 Growth_{it} * \Delta E_{it} + \beta_4 EVAR_{it} * \Delta E_{it} + \beta_5 DE_{it} * \Delta E_{it} + \beta_6 \Delta BV_{it} + \beta_t YearDummy + \beta_t YearDummy * \Delta E_{it} + \varepsilon_{it}$

		Panel C1. EM=*DACC*			Panel C2. EM=*RDISX*		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
ΔE	+	2.3462	2.96	0.0016	2.0707	2.56	0.0054
Test Variable							
DACC_H*ΔE	−	−0.2404	−1.83	0.0342	n/a	n/a	n/a
RDISX_H*ΔE	−	n/a	n/a	n/a	0.2967	2.22	0.0133
Adjusted R^2		16.60%			16.65%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

(The table is continued on the next page.)

TABLE 4.8 (Continued)

Panel D: Dependent Variable = Market-adjusted Return (*Ret*)

Sample Period: 1989–2007

Model: $Ret_{it} = \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC\_H * \Delta E_{it}$ (or $\beta_2 RDISX\_H * \Delta E_{it}$) $+ \beta_3 Growth_{it} * \Delta E_{it}$
$+ \beta_4 EVAR_{it} * \Delta E_{it} + \beta_5 DE_{it} * \Delta E_{it} + \beta_6 \Delta BV_{it} + \beta_t YearDummy$
$+ \beta_t YearDummy * \Delta E_{it} + \varepsilon_{it}$

		Panel D1. EM=*DACC*			**Panel D2. EM=*RDISX***		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
ΔE	+	2.8090	2.98	0.0015	2.5346	2.69	0.0036
Test Variable							
DACC_H*ΔE	−	−0.3249	−2.91	0.0019	n/a	n/a	n/a
RDISX_H*ΔE	−	n/a	n/a	n/a	0.2394	1.88	0.0304
Adjusted R^2		9.77%			9.58%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

Note 1: In **Panel B**, *P* represents stock price three months after the fiscal yearend. In **Panel C**, *ΔP* is change in price deflated by stock price at the end of previous year. In **Panel D**, *Ret* is market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution, whereas *E* and *ΔE* are winsorized at −1.5 and +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991). All control variables except for *EVAR* are winsorized at the top and bottom 1 percent of the distribution. Variable *EVAR* is winsorized to 100 (see Barth et al. 1999).

Note 2: In **Panels B–D**, *DACC_H* (i.e., high AM group) is an indicator variable which is equal to 1 for an observation if its *DACC* is above the median of *DACC* distribution and zero otherwise. On the other hand, *RDISX_H* (i.e., high RM group) is an indicator variable which is equal to 1 for an observation if its *RDISX* is above the median of *RDISX* distribution and zero otherwise. *DACC* is the performance-unadjusted discretionary accruals and *RDISX* is the performance-unadjusted abnormal discretionary expenses multiplied by −1.

Note 3: In **Panels B–D**, results on control variables are not reported to conserve space. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

Please refer to **Appendix 4-I** for variable definitions and measurements.

TABLE 4.9
Further Analysis: Sample Partitioned by the Tercile Distribution of Each EM Measure

Panel A1. Univariate Results based on *DACC*^{PM}

Mean							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
	High	**Moderate**	**Low**	**(1) − (2)**	**(1) − (3)**	**(2) − (3)**	**Total N**
P	24.8410	29.7299	28.6273	−4.8889 ***	−3.7863 ***	1.1026	
ΔP	0.1672	0.1537	0.2081	0.0135	−0.0410 *	−0.0545 ***	
Ret	0.1265	0.1220	0.1960	0.0046	−0.0695 ***	−0.0741 ***	
N	1,679	1,680	1,680				5,039

Median							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
	High	**Moderate**	**Low**	**(1) − (2)**	**(1) − (3)**	**(2) − (3)**	**Total N**
P	19.7500	26.0313	24.7500	−6.2813 ***	−5.0000 ***	1.2813 *	
ΔP	0.0600	0.0661	0.0942	−0.0061	−0.0342 ***	−0.0281 **	
Ret	0.0070	0.0269	0.0962	−0.0199	−0.0892 ***	−0.0693 ***	
N	1,679	1,680	1,680				5,039

(The table is continued on the next page.)

TABLE 4.9 (Continued)

Panel A2. Univariate Results based on $RDISX^{PM}$

	Mean									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**		**(6)**		**(7)**
	High	**Moderate**	**Low**	**(1) − (2)**	**(1) − (3)**		**(2) − (3)**		**Total N**
P	28.6369	28.1327	26.4310	0.5042	2.2058	***	1.7016	**	
ΔP	0.1529	0.1836	0.1925	−0.0307	−0.0396	*	−0.0089		
Ret	0.1290	0.1399	0.1756	−0.0109	−0.0466	**	−0.0357	*	
N	1,679	1,680	1,680						5,039

	Median									
	(1)	**(2)**	**(3)**	**(4)**		**(5)**		**(6)**		**(7)**
	High	**Moderate**	**Low**	**(1) − (2)**		**(1) − (3)**		**(2) − (3)**		**Total N**
P	24.2500	24.7813	21.8150	−0.5313		2.4350	***	2.9663	***	
ΔP	0.0661	0.0926	0.0719	−0.0265	**	−0.0058		0.0207		
Ret	0.0282	0.0388	0.0564	−0.0106		−0.0283		−0.0177		
N	1,679	1,680	1,680							5,039

Note 1: Panels A1–A2 show the comparison of mean and median values of *P*, *ΔP*, and *Ret* among the high, the moderate, and the low AM (RM) groups. In **Panel A1**, a firm is assigned to High (Low) AM group if its $DACC^{PM}$ falls in the top-third (bottom-third) of $DACC^{PM}$ distribution, while Moderate consists of firms whose $DACC^{PM}$ falls in the middle-third of $DACC^{PM}$ distribution. In **Panel A2**, a firm is assigned to High (Low) RM group if its $RDISX^{PM}$ falls in the top-third (bottom-third) of $RDISX^{PM}$ distribution, while Moderate consists of firms whose $RDISX^{PM}$ falls in the middle-third of $RDISX^{PM}$ distribution. $DACC^{PM}$ is the performance-matched discretionary accruals and $RDISX^{PM}$ is the performance-matched abnormal discretionary expenses multiplied by −1.
Note 2: In **Panels A1–A2**, *P* represents stock price three months after the fiscal yearend; *ΔP* is change in price deflated by stock price at the end of previous year; and *Ret* represents market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution.
Note 3: In **Panels A1–A2**, ***, ** and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively, using two-tailed *t*-tests for means and two-tailed Wilcoxon tests for medians.

(The table is continued on the next page.)

TABLE 4.9 (Continued)

Panel B: Dependent Variable = Price (*P*)

Sample Period: 1989–2007

Model: $P_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 DACC^{PM}\_H * E_{it}$ (or $\beta_2 RDISX^{PM}\_H * E_{it}$)

$+ \beta_3 DACC^{PM}\_M * E_{it}$ (or $\beta_3 RDISX^{PM}\_M * E_{it}$) $+ \beta_4 Growth_{it} * E_{it} +$

$\beta_5 EVAR_{it} * E_{it}$

$+ \beta_6 DE_{it} * E_{it} + \beta_7 BV_{it} + \beta_t YearDummy + \beta_t YearDummy * E_{it} + \varepsilon_{it}$

		Panel B1. EM=*DACC*^{PM}			**Panel B2. EM=*RDISX*^{PM}**		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
E	+	10.7972	4.73	<.0001	10.6833	4.54	<.0001
Test Variable							
DACC*^{PM}*_H*E	−	−3.1017	−4.04	<.0001	n/a	n/a	n/a
RDISX*^{PM}*_H*E	−	n/a	n/a	n/a	−1.3712	−1.40	0.0813
DACC*^{PM}*_M*E	−	−1.7554	−2.31	0.0106	n/a	n/a	n/a
RDISX*^{PM}*_M*E	−	n/a	n/a	n/a	−1.9243	−2.15	0.0159
Adjusted R^2		41.08%			40.90%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

(The table is continued on the next page.)

TABLE 4.9 (Continued)

Panel C: Dependent Variable = Changes in Price (*ΔP*)

Sample Period: 1989–2007

Model: $\Delta P_{it} = \beta_0 + \beta_1 \Delta E_{it} + \beta_2 DACC^{PM}\_H * \Delta E_{it}$ (or $\beta_2 RDISX^{PM}\_H * \Delta E_{it}$)
$+\beta_3 DACC^{PM}\_M * \Delta E_{it}$ (or $\beta_3 RDISX^{PM}\_M * \Delta E_{it}$) $+ \beta_4 Growth_{it} * \Delta E_{it}$
$+\beta_5 EVAR_{it} * \Delta E_{it} + \beta_6 DE_{it} * \Delta E_{it} + \beta_7 \Delta BV_{it} + \beta_t YearDummy$
$+ \beta_t YearDummy * \Delta E_{it} + \varepsilon_{it}$

		Panel C1. EM=$DACC^{PM}$			Panel C2. EM=$RDISX^{PM}$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
ΔE	+	2.4917	3.06	0.0012	2.0694	2.53	0.0058
Test Variable							
$DACC^{PM}\_H*\Delta E$	−	−0.3055	−1.77	0.0386	n/a	n/a	n/a
$RDISX^{PM}\_H*\Delta E$	−	n/a	n/a	n/a	−0.0158	−0.10	0.4611
$DACC^{PM}\_M*\Delta E$	−	−0.3954	−1.64	0.0505	n/a	n/a	n/a
$RDISX^{PM}\_M*\Delta E$	−	n/a	n/a	n/a	0.3691	2.59	0.0049
Adjusted R^2		16.68%			16.74%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

(The table is continued on the next page.)

TABLE 4.9 (Continued)

Panel D: Dependent Variable = Market-adjusted Return (*Ret*)

Sample Period: 1989–2007

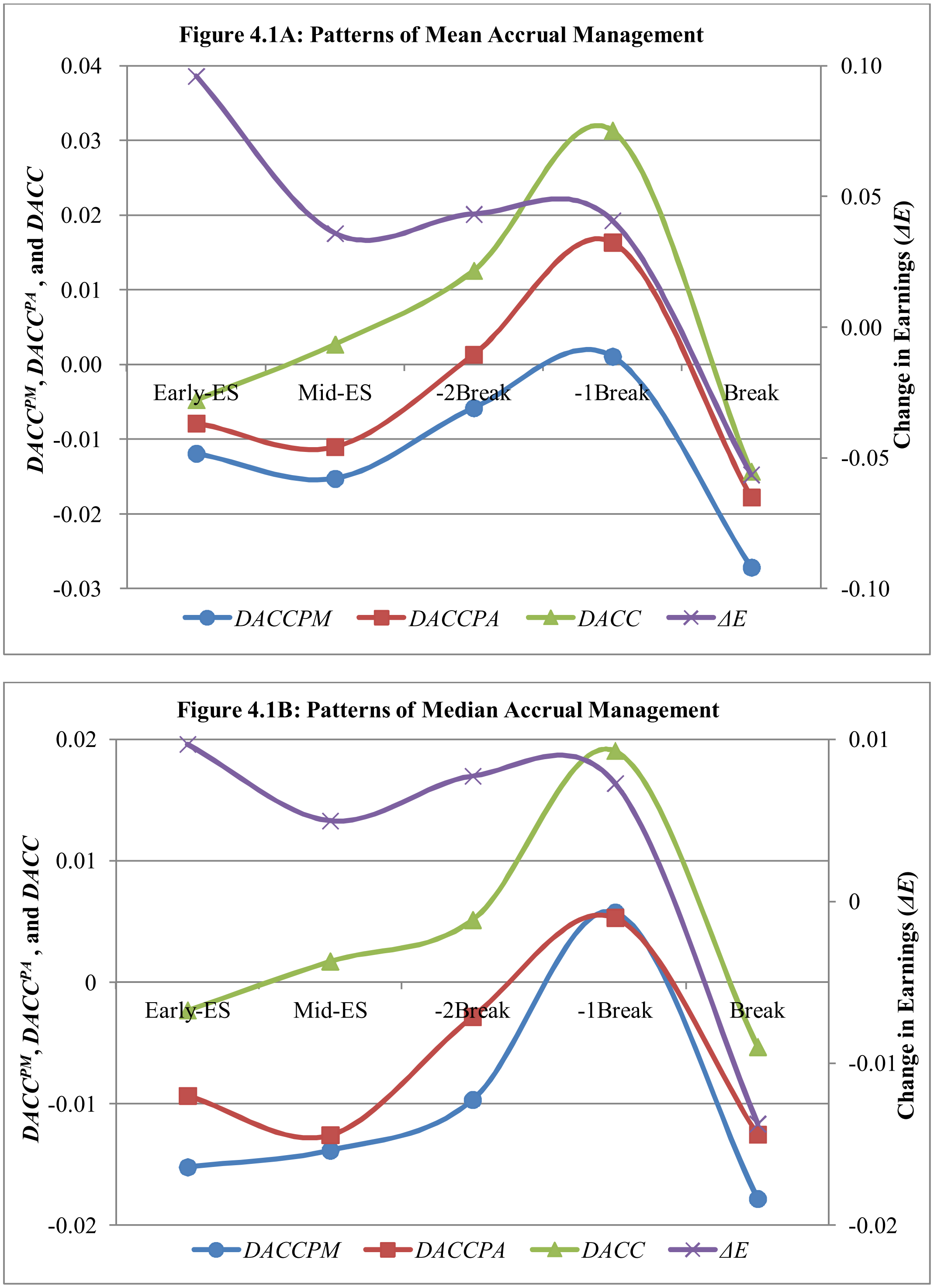
Model: $Ret_{it} = \beta_0 + \beta_1\Delta E_{it} + \beta_2 DACC^{PM}\_H*\Delta E_{it}(\text{or } \beta_2 RDISX^{PM}\_H*\Delta E_{it})$
$+\beta_3 DACC^{PM}\_M*\Delta E_{it}(\text{or } \beta_3 RDISX^{PM}\_M*\Delta E_{it}) + \beta_4 Growth_{it}*\Delta E_{it}$
$+\beta_5 EVAR_{it}*\Delta E_{it} + \beta_6 DE_{it}*\Delta E_{it} + \beta_7\Delta BV_{it} + \beta_t YearDummy$
$+ \beta_t YearDummy*\Delta E_{it} + \varepsilon_{it}$

		Panel D1. EM=$DACC^{PM}$			Panel D2. EM=$RDISX^{PM}$		
	Prediction	**Coeff.**	***t*-stat**	***p*-value**	**Coeff.**	***t*-stat**	***p*-value**
ΔE	+	2.8633	3.11	0.0010	2.5349	2.67	0.0039
Test Variable							
$DACC^{PM}\_H*\Delta E$	−	−0.3446	−2.30	0.0108	n/a	n/a	n/a
$RDISX^{PM}\_H*\Delta E$	−	n/a	n/a	n/a	−0.0104	−0.07	0.4716
$DACC^{PM}\_M*\Delta E$	−	−0.2503	−1.10	0.1359	n/a	n/a	n/a
$RDISX^{PM}\_M*\Delta E$	−	n/a	n/a	n/a	0.2951	2.04	0.0211
Adjusted R^2		9.67%			9.64%		
N		5,039 firm-year obs. (775 earnings strings)			5,039 firm-year obs. (775 earnings strings)		

Note 1: In **Panel B**, In **Panel B**, *P* represents stock price three months after the fiscal yearend. In **Panel C**, *ΔP* is change in price deflated by stock price at the end of previous year. In **Panel D**, *Ret* is market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution, whereas *E* and *ΔE* are winsorized at −1.5 and +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991). All control variables except for $EVAR$ are winsorized at the top and bottom 1 percent of the distribution. Variable $EVAR$ is winsorized to 100 (see Barth et al. 1999).
Note 2: In **Panels B–D**, $DACC^{PM}\_H$ ($DACC^{PM}\_M$) is an indicator variable which is equal to 1 for an observation if its $DACC^{PM}$ falls in the top-third (middle-third) group of $DACC^{PM}$ distribution and zero otherwise. On the other hand, $RDISX^{PM}\_H$ ($RDISX^{PM}\_M$) is an indicator variable which is equal to 1 for an observation if its $RDISX^{PM}$ falls in the top-third (middle-third) group of $RDISX^{PM}$ distribution and zero otherwise. $DACC^{PM}$ is the performance-matched discretionary accruals and $RDISX^{PM}$ is the performance-matched abnormal discretionary expenses multiplied by −1.
Note 3: In **Panels B–D**, results on control variables are not reported to conserve space. All *t*-values are reported using robust standard errors to correct heteroskedasticity problem and firm clustering effect. The *p*-values are one-tailed if there is a prediction, and two-tailed otherwise.

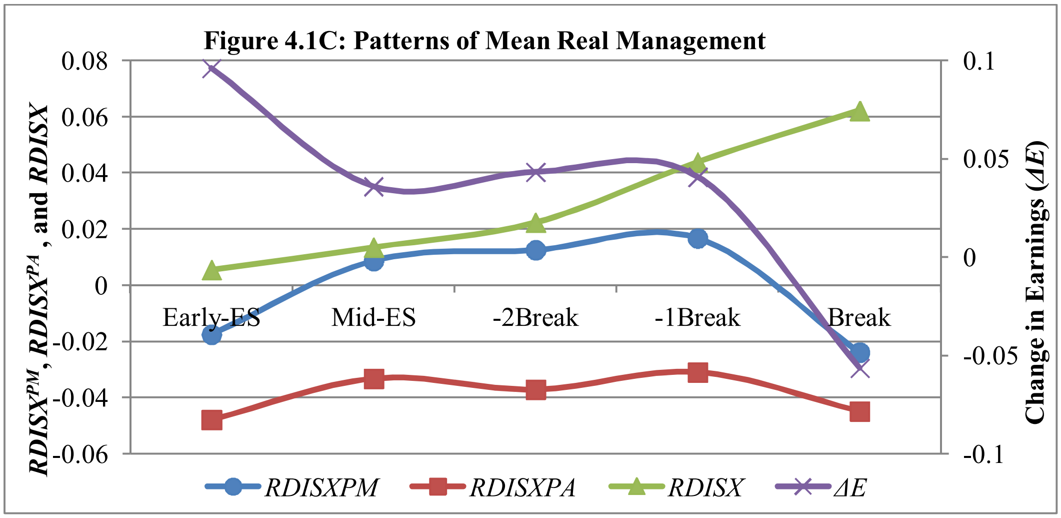
Please refer to **Appendix 4-I** for variable definitions and measurements.

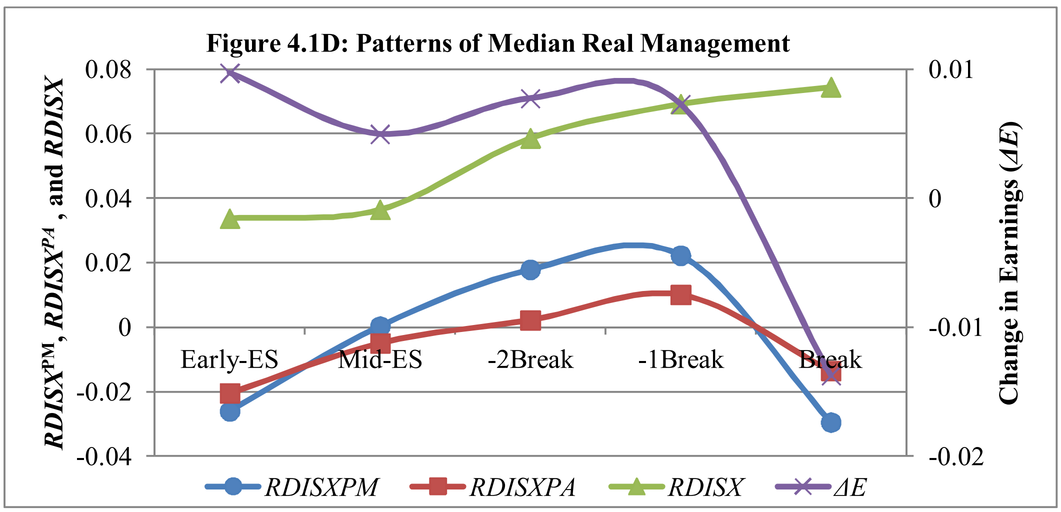
FIGURE 4.1: Patterns of Earnings Management (1989–2007; N = 775 Earnings Strings)



(The figure is continued on the next page.)

FIGURE 4.1 (Continued)

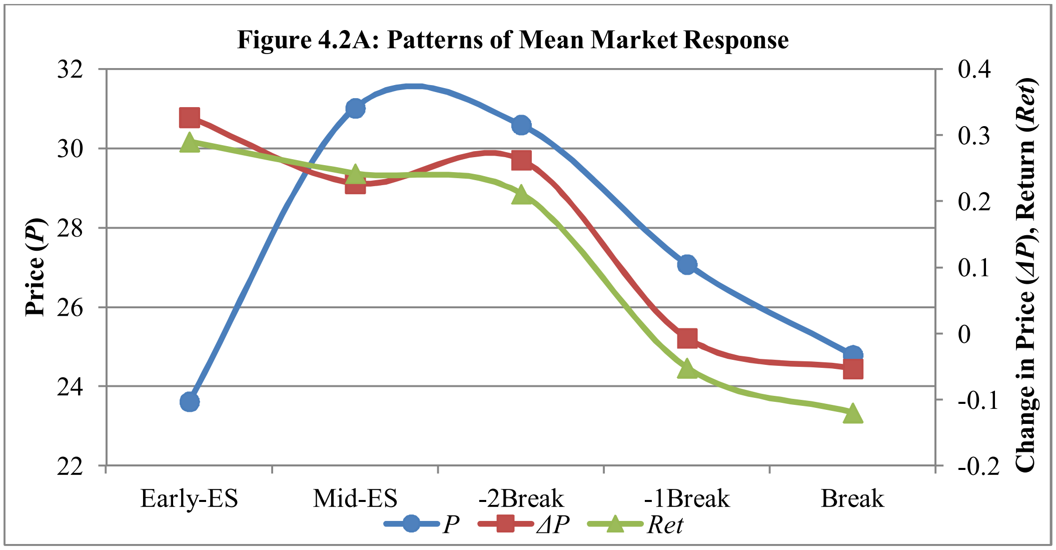


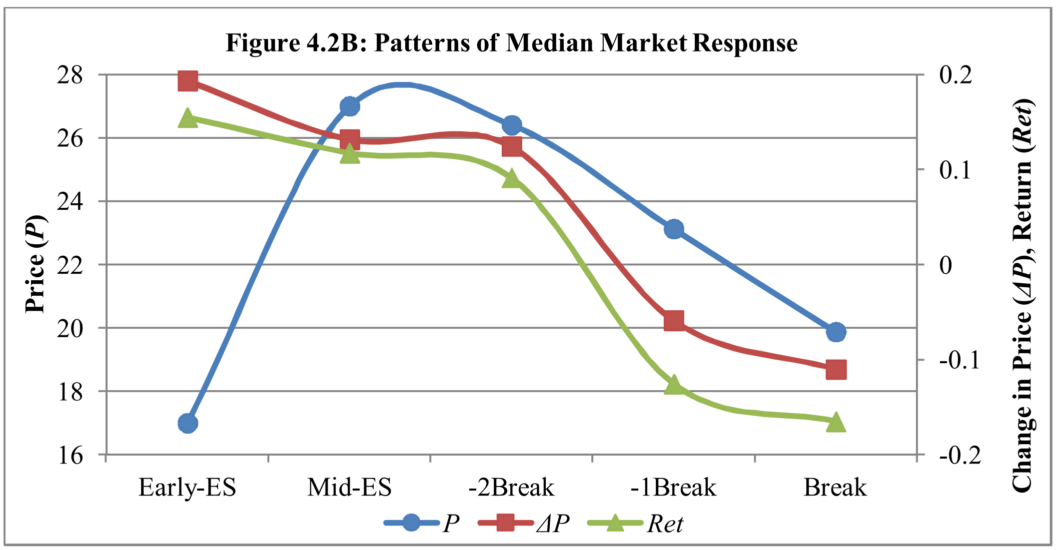


Note 1: These four graphs depict the mean and median patterns of accrual and real management measures, as well as those of earnings changes of ES firms along the following five sub-periods of an earnings string: Early-ES (the first two years of an earnings string), Mid-ES (the period from the third year of an earnings string to three years before the break), −2Break (two years before the break), −1Break (one year before the break) and Break (the year when an earnings string is broken). The X axis represents each of the five periods of an earnings string while the Y axis represents the levels of accrual and real management measures along with that of change in earnings. The sample period covers from 1989 to 2007.

Note 2: While ΔE represents changes in earnings, $DACC^{PM}$ and $RDISX^{PM}$ represent performance-matched discretionary accruals and performance-matched abnormal discretionary expenses multiplied by −1; $DACC^{PA}$ and $RDISX^{PA}$ represent performance-adjusted discretionary accruals and performance-adjusted abnormal discretionary expenses multiplied by −1; *DACC* and *RDISX* represent performance-unadjusted discretionary accruals and performance-unadjusted abnormal discretionary expenses multiplied by −1; and ΔE is changes in earnings per share deflated by stock price at the end of previous year. ΔE is winsorized at −1.5 and +1.5 (see Barth et al. 2008; Kothari et al. 2002; and Easton and Harris 1991).

FIGURE 4.2: Patterns of Market Response (1989–2007; N = 775 Earnings Strings)





Note 1: These two graphs depict the mean and median patterns of *P*, *ΔP*, and *Ret* of ES firms along the following five sub-periods of an earnings string: Early-ES (the first two years of an earnings string), Mid-ES (the period from the third year of an earnings string to three years before the break), −2Break (two years before the break), −1Break (one year before the break) and Break (the year when an earnings string is broken). The X axis represents each of the five periods of an earnings string while the Y axis represents the levels of *P*, *ΔP*, and *Ret*, respectively. The sample period covers from 1989 to 2007.

Note 2: *P* represents stock price three months after the fiscal yearend; *ΔP* is change in price deflated by stock price at the end of previous year; and *Ret* is market-adjusted return, defined as the difference between ES firm *i*'s compound annual buy-and-hold return over the 12-month period ending three months after the fiscal yearend and the compound annual return of value-weighted market index return over the same period. *P*, *ΔP*, and *Ret* are winsorized at the top and bottom 1 percent of the distribution.