Real Earnings Management and Future Performance:
Testing the Life-Cycle Hypothesis

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Abstract

This study focuses on the extent to which evidence of real earnings management (REM) differs between firms in various stages of their life cycles as well as between various levels of operating performance subsequent to REM. To investigate the adoption of REM for firms in different stages of their life cycles, we employ the method for classifying life-cycle stages. We find that firms in the growth stage adopt REM to a lesser degree than those in other stages. We also observe that firms engaging in REM have a better one-year-ahead industry-adjusted return on assets relative to firms that do not engage in REM, which partially supports the notion of the signaling mechanism of REM in the growth stage. In addition, we find that firms engaging in REM generally perform worse than firms that do not, particularly those in the mature stage. This is consistent with the assumption of the opportunistic intention of managers who conduct REM.

Keywords: Real earnings management, Corporate life cycle, Subsequent operating performance.
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1. Introduction

Most existing research on earnings management has concentrated on accrual-based earnings management (AEM), in which earnings are managed by manipulating accruals without directly influencing cash flow. However, well-publicized accounting scandals and the passage of the Sarbanes–Oxley Act in the US (SOX, July 30, 2002) have led the investigation of earnings management into a new area, i.e., real earnings management (REM).

Ewert and Wagenhofer (2005) show that the tightening of accounting standards and the subsequent increased scrutiny of AEM has escalated the use of REM. This is further supported by Cohen et al. (2008), who find that AEM disappeared in the post-SOX period, concurrent with the increase in REM. A survey conducted by Graham et al. (2005) shows that managers tend to engage in REM only if the impact on the future value of the firm is not too severe. Moreover, Juan et al. (2009) find that many ex-post failed firms in the UK engaged in both accounting and real activities manipulation in the four years prior to failure. Chi et al. (2011) use strong upward earnings management incentives data to examine whether firms resort to REM when their ability to manage accruals is constrained by high-quality auditors. They find an unintended consequence of high-quality auditors constraining AEM, namely, firms resorting to potentially costlier REM.

REM is a process of changing real operating activities to increase reported earnings while influencing the underlying cash flow of the firm. Roychowdhury (2006) documents several forms of REM, such as discounts to temporarily increase sales, overproduction to report lower cost of goods sold, and reduction of discretionary expenditures to improve reported earnings.

The documented prevalence of REM over the last decade emphasizes the importance of its economic consequences, and the literature concerning this issue has been growing. However, empirical results have been mixed. Conflicting empirical results regarding the positive or negative influence of REM on performance have led to opposing explanations regarding the reasons that managers adopt REM. A positive correlation between REM and the subsequent operating performance of firms suggests that the signaling mechanism may effect the adoption of REM (Gunny 2010; Taylor and Xu 2010), while a negative correlation suggests that managers have opportunistic motives in adopting REM (Gunny 2005; Zang 2012; Cohen and Zarowin 2010).

Most studies examining the relationship between REM and future operating performance have considered accounting flexibility (i.e., net operating assets, NOA) or earnings management incentives (i.e., meeting or slightly surpassing set thresholds). However, none of these studies has provided a
stricter or more comprehensive means of distinguishing firms in various stages of their life cycles. It has nevertheless been highlighted that firms in different stages of their life cycles often face disparate difficulties and employ different portfolios of optimal operating strategies (Adizes 1979; Porter 1980). Engaging in REM means deviating from optimal operational activities (Roychowdhury 2006); therefore, the degree to which firms employ REM and their purpose for doing so varies according to their stage in the life cycle; both these factors may influence subsequent operating performance in dissimilar ways. Thus, firms conducting REM in different stages may experience different economic consequences.

This study employs the method developed by Anthony and Ramesh (1992) to investigate the extent to which REM is adopted by firms in different stages of their life cycles. In accordance with previous studies, firms with abnormally high levels of REM proxies and scaled earnings or scaled earnings changes meeting the zero threshold are identified as REM-suspected firms. Our empirical results indicate that firms in the growth stage exhibit less evidence of REM than do firms in other stages. Regarding the economic consequences of REM, firms engaging in REM generally perform worse than those that do not, which is consistent with the opportunistic motive for managers to conduct REM (Gunny 2005; Zang 2012; Cohen and Zarowin 2010). There is little evidence suggesting that, in the growth stage, firms engaging in REM have a better one-year-ahead industry-adjusted return on assets (ROA) than firms that do not engage in REM.

This paper integrates life-cycle classification to more comprehensively examine the influence of REM on firms. Our results might assist regulators in understanding the consequences of tighter business scrutiny in Taiwan and in reevaluating their decisions.

Section 2 provides a review of previous studies dealing with REM and the theory of the corporate life cycle (CLC). Section 3 provides a description of the sample and the measurements used. Section 4 presents descriptive statistics, estimation models, and empirical results. The implications and contributions of the study are provided in Section 5.

2. Literature Review

2.1 Real earnings management

The passage of SOX in response to highly publicized accounting scandals has led to stricter scrutiny of traditional AEM. However, the result of tighter accounting standards often conflicts with the intention behind them. As confirmed by Ewert and Wagenhofer (2005), the tightening of accounting standards actually increases earnings quality, which in turn increases the marginal benefits of earnings management. Thus, as AEM becomes less effective under tighter accounting standards, managers must adopt a costlier method, REM.

Cohen et al. (2008) empirically examine the influence of the passage of SOX on types of earnings
management. They find that AEM steadily increased in the period preceding the passage of SOX and declined in the post-SOX period; with the decline of AEM, the level of REM significantly increased.

Juan et al. (2009) find that, in the four years prior to failure, firms in the UK managed earnings upward by accounting manipulation and implementation of real operating actions. The substitution effect of AEM and REM is elucidated by Zang (2012) and Graham et al. (2005). The latter finds that 78% of the financial executives surveyed revealed a tendency to engage in REM to manage the perceptions of financial reporting as long as the impact on the subsequent value of the firm was not too severe.

Roychowdhury (2006) develops empirical models to detect REM and proves the existence of REM to achieve earnings thresholds. Cohen and Zarowin (2010) find that in periods of seasoned equity offerings, firms tend to conduct REM when being audited by a Big Eight auditor or one with longer tenure, or when facing a high risk of litigation or limited accounting flexibility (i.e., high NOA).

Given the prevalence of REM, consideration of its economic consequence is important. Unlike AEM, REM has a real influence on operations and cash flow. Ewert and Wagenhofer (2005) document the higher cost of REM, which is also confirmed by Cohen et al. (2008). REM influences the future value of a firm, as represented by its future operating performance. A growing body of literature has focused on the economic consequences of REM, but empirical results remain mixed.

Cohen and Zarowin (2010) find that SEO firms engage in REM, and the decline in post-SEO performance due to REM is more severe than the negative consequences resulting from accruals management. Zang (2012) also observes negative ROA and cash flow from operations (CFO) after firms engaged in REM. Gunny (2005) suggests that all types of real manipulation are associated with a significant drop in ROA and CFO, excluding abnormal gains from asset sales.

Gunny (2010) shows that conducting REM simply to meet earnings thresholds is positively related with subsequent operating performance, and that firms reducing R&D or selling, general, and administrative (SG&A) expenditures merely to meet earnings thresholds have higher subsequent industry-adjusted ROA. Taylor and Xu (2010) find that REM is significantly and positively associated with subsequent operating performance, but suggest that it may not cause a significant negative consequence because REM is not conducted regularly.

2.2 Corporate life cycle

According to the concept of the corporate life cycle theorized by Adizes (1979), firms face different opportunities and difficulties in different stages of their life cycles. Porter (1980) argues that the optimal portfolios of tangible and intangible assets change throughout the life cycle of a firm.
Spence (1977) proves that in industries with homogeneous products, excess capacity helps existing firms by discouraging the entry of new firms. In industries with differentiated products, advertising or engaging in other market activities that influence customer loyalty (i.e., reducing demand flexibility), installing retail outlets, or building distribution systems are strategically useful methods. That is, even if they fail to minimize costs, firms in the introduction and growth stages must establish entry barriers to remain profitable in the long run.

Miller and Friesen (1984) show that firms in the growth stage tend to broaden their product line by adapting existing products to new markets through dramatic innovation, as well as by supporting product extension, market development, and advancement controls. These changes also involve recruiting additional staff.

Entering the mature stage, firms tend to become more conservative, providing fewer innovations, avoiding costly product extensions, economizing production, ensuring favorable prices, and emphasizing sales volumes to achieve better operating efficiency and profitability. In the decline stage, products begin to lose appeal and sales volumes become harder to sustain, making it necessary to conserve resources by abstaining from innovation, cutting prices, and so on (Miller and Friesen 1984).

Young and Huang (2004) examine how the characteristics of asset portfolios (i.e., working capital, long-term investments, fixed assets, and intangible assets) differ in different stages of the life cycle and investigate how these changes relate to future performance. They suggest that firms in the growth stage have a higher percentage of working capital and intangible assets (e.g., R&D, advertising, or employee training), which decrease as firms enter the maturity and decline stages. In contrast, the percentage of long-term investments and fixed assets (lower costs through economies of scale) is lowest in the growth stage and increases as firms mature and decline. They also find that, in the growth stage, firms with a higher percentage of intangible assets have better future operating performance, while in the decline stage, firms with a higher percentage of long-term investment and fixed assets have better future operating performance.

The life cycle concept is widely discussed. Different stages of the life cycle affect the behavior of management. Previous studies used the life-cycle stage to explore the accrual anomaly relationship (Taso et al. 2010), analysts’ forecasts (Taso et al. 2009), and the value-relevance of R&D and capital expenditure (Chin et al. 2005). They found that the consideration of life cycle was an important factor, and that further exploration of its different stages can explain the mixed results obtained by previous studies.

2.3 Real earnings management and corporate life cycle

We infer how the position of firms in various stages of their life cycles influences the shift from AEM to REM. We confirm that growth prospects are significantly positively related to AEM and
significantly negatively related to REM; thus, firms in the growth stage should exhibit less REM than those in the mature and decline stages. These inferences lead to our first hypothesis:

**H1:** Firms in the growth stage exhibit less evidence of REM than those in the mature and decline stages.\(^1\)

This implies that the optimal strategy used by firms varies according to the life-cycle stage. For example, in the growth stage, product and market development are critical to gain market acceptance and market share, thus expenditures on R&D, advertising, and other promotions will be greater. During the mature stage, reducing costs by increasing capacity (i.e., increasing production to lower fixed costs), improving production efficiency, and sustaining favorable prices and sales volumes is generally the best strategy (Miller and Friesen 1984). However, REM changes the real operating activities of firms, causing them to deviate from the optimal strategy in certain life-cycle stages, resulting in different costs. The life-cycle stage in which REM is conducted varies in its impact on the future value of the firm, suggesting that managers employ REM with different intentions; it can be used either opportunistically or considering the future of the firm.

Zang (2012) identifies a negative relationship between REM and its cost determinants (i.e., the economic consequences of deviating from optimal operations), indicating that the intention of managers to enhance the future value of the firm is supported if REM is positively associated with the subsequent operating performance—that is, managers use the costlier but more credible method of transferring asymmetric information to the capital market. If REM is negatively associated with the subsequent operating performance, the managers’ myopic intention of achieving short-term targets is supported—that is, consistent with the notion that the manager’s motive to engage in REM is opportunistic (Gunny 2005, 2010).

Generally, for firms in the growth stage, conducting REM to achieve earnings thresholds may result in severe economic consequences, because REM weakens their competitive advantage, thereby harming the long-term profitability of the firm (Miller and Friesen 1984; Zang 2012). Therefore, if there is a positive correlation between REM and subsequent operating performance for firms in the growth stage, the signaling mechanism described by Gunny (2005, 2010) is supported—that is, firms use a costlier but more credible way to affect their future prospects. This analysis leads to hypothesis 2.1:

**H2.1:** In the growth stage, the subsequent industry-adjusted ROA (industry-adjusted CFO) of REM-

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\(^1\) In accordance with Cohen and Zarowin (2010), five measures are used here to identify REM, including abnormal levels of CFO, production costs, discretionary expenses, the sum of production costs and discretionary expenses multiplied by negative one, and the sum of CFO and discretionary expenses multiplied by negative one, as detailed in section 3.2.
suspected firms is higher than that of non-REM firms.

For firms in the mature and decline stages, engaging in REM to achieve earnings thresholds tends to be myopic (Miller and Friesen 1984). This means that a negative correlation between REM and the subsequent operating performance of firms in the mature and decline stages supports the opportunistic intention of management (Gunny 2005, 2010), resulting in hypothesis 2.2:

H2.2: In the mature stage, subsequent industry-adjusted ROA (industry-adjusted CFO) of REM-suspected firms is lower than that of non-REM firms.

3. Data and methodology

3.1 Data and sample description

This study uses annual data for all firms in the TSEC and GTSM markets in the Taiwan Economic Journal (1,343 firms, 11,269 firm-years) from 1998 to 2006. The data is restricted to the years preceding 2006, enabling the examination of subsequent performance from 2007 to 2009. Data from 1998 onward is used to avoid interference from the Asian financial crisis that occurred that year. Firms in the financial industry are excluded (44 firms, 313 firm-years) due to their different modes of operation. We exclude a further 33 firms (855 firm-years) for which data to estimate all three proxies for REM and earnings thresholds are insufficient, and 514 firms (6,216 firm-years) are excluded because of the data requirements for life-cycle stage classification. After calculating the control variables and data for various industries, the final set of data includes 3,213 observations drawn from 647 firms and 3,452 observations drawn from 693 firms to test hypotheses 1 and 2, respectively.

3.2 Identification and measurement of REM

To mitigate concern regarding the difficulty of identifying the intentions of managers in performing earnings management, firms meeting earnings thresholds and having abnormal levels of REM proxies are identified as REM-suspected firms (Roychowdhury 2006; Gunny 2010).

In general, REM can be distinguished into two types: operating and investing (e.g., gain on asset sales). Our focus here is operating REM, represented by increasing discounts or more lenient credit terms to accelerate sales, increasing production to report lower costs of goods sold, and decreasing discretionary expenses including advertising, R&D, and SG&A expenses.

Previous studies define abnormal levels of CFO (Ab-CFO), discretionary expenses (Ab-DISEXP), and production costs (Ab-PROD) by subtracting normal (expected) figures from the actual figures. To generate normal levels, we employ the model implemented by Roychowdhury (2006) and Cohen and Zarowin (2010), running the following cross-sectional equations for each industry and year.
The normal CFO level is estimated using Eq. (1), as follows:

\[
\text{CFO}_t / A_{t-1} = \alpha_0 + \alpha_1 \left( 1 / A_{t-1} \right) + \beta_1 \left( S_t / A_{t-1} \right) + \beta_2 \left( \Delta S_t / A_{t-1} \right) + \varepsilon_t,
\]

where

\( A_{t-1} \) = total assets at the beginning of period \( t \)
\( \text{CFO}_t \) = cash flows from operations in period \( t \)
\( S_t \) = net sales during period \( t \).
\( \Delta S_t = S_t - S_{t-1} \)

Production costs (denoted as PROD) are defined as the sum of the cost of goods sold (denoted as COGS) and the change in inventory (denoted as \( \Delta \text{INV} \)). The normal level of production costs is estimated by Eq. (4), developed from Eqs. (2) and (3), as follows:

\[
\text{COGS}_t / A_{t-1} = \alpha_0 + \alpha_1 \left( 1 / A_{t-1} \right) + \beta \left( S_t / A_{t-1} \right) + \varepsilon_t,
\]

where

\( A_{t-1} \) = total assets at the beginning of period \( t \)
\( \text{COGS}_t \) = cost of goods sold in period \( t \)
\( S_t \) = net sales during period \( t \).
\( \Delta \text{INV}_t = \Delta S_t - \Delta S_{t-1} \)

Similarly, the normal level of discretionary expenses is estimated from Eq. (5), as follows:

\[
\text{DISEXP}_t / A_{t-1} = \alpha_0 + \alpha_1 \left( 1 / A_{t-1} \right) + \beta \left( S_t / A_{t-1} \right) + \varepsilon_t,
\]

where

\( A_{t-1} \) = total assets at the beginning of period \( t \)
\( \text{DISEXP}_t \) = discretionary expenses in period \( t \)
\( S_t \) = net sales during period \( t \).

However, according to Roychowdhury (2006), dealing with discretionary expenses using the above equation would result in a mechanical problem—that is, if sales are manipulated upward to increase reported earnings in any year, running Eq. (5) would result in unusually low residuals for that year, regardless of whether the discretionary expenses were reduced. To control for this problem, the normal level of discretionary expenses is estimated using the following equation, with the discretionary
expenses expressed as a function of lagged sales (Roychowdhury 2006; Cohen and Zarowin 2010):

\[
\text{DISEXP}_t / A_{t-1} = \alpha_0 + \alpha_1 (1 / A_{t-1}) + \beta (S_{t-1} / A_{t-1}) + \varepsilon_t, \tag{6}
\]

where

\begin{align*}
A_{t-1} &= \text{total assets at the beginning of period } t \\
\text{DISEXP}_t &= \text{discretionary expenses in period } t \text{ (advertising expenses + R&D expenses + SG&A expenses)} \\
S_{t-1} &= \text{net sales during period } t - 1.
\end{align*}

In addition to the three individual proxies for REM, we employ the method developed by Cohen and Zarowin (2010) and Zang (2012) to capture the total effects of REM. In Cohen and Zarowin (2010), two aggregate measures are created instead of combining the three individual proxies, because the sum of Ab-CFO and Ab-PROD leads to double counting.\(^2\) Consistent with Cohen and Zarowin (2010), Ab-REM1 is created by the sum of Ab-DISEXP multiplied by negative one and Ab-PROD. In addition, Ab-REM2 is created by the sum of Ab-DISEXP and Ab-CFO, with both addends multiplied by negative one. Thus, the higher the amount of Ab-REM1 and/or Ab-REM2, the more likely it is that firms are engaging in REM.

### 3.3 Incentive to conduct REM

Meeting zero earnings and/or the previous year’s earnings is used as the criterion to identify the incentive of the manager to conduct earnings management. Burgstahler and Dichev (1997) confirm that firms manage reported earnings to avoid losses or a decrease in earnings.

In accordance with the method implemented by Gunny (2010), we construct intervals of asset-scaled earnings and asset-scaled changes in earnings for widths of 0.01; firms with positive scaled earnings or positive scaled changes in earnings between 0 and 0.01 are identified as those avoiding losses and/or just meeting the previous year’s earnings.

Our examination of the frequency distributions of asset-scaled earnings and changes in earnings provides results consistent with previous findings. Specifically, the irregularities around zero show earnings manipulation to avoid losses or declines in earnings. Furthermore, in the empirical results of Burgstahler and Dichev (1997), the upward shift around zero is more pronounced for the distribution of scaled earnings.

The relationship between REM and earnings thresholds is examined by Gunny (2010), who confirms that abnormal levels of R&D and SG&A expenses are negatively related and abnormal production costs are positively and significantly related to firms just meeting zero earnings or zero earnings growth. Thus, earnings thresholds should effectively identify the incentive to engage in REM.

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\(^2\) According to Cohen and Zarowin (2010), activities leading to abnormally high production costs result in abnormally low CFO, making the sum of these two proxies double counting.
We replicate Gunny’s (2010) procedure of examining REM and earnings thresholds to check the applicability of the data in Taiwan. The untabulated results show that, except for Ab-DISEXP, earnings thresholds are significantly and negatively associated with Ab-CFO and significantly and positively associated with Ab-PROD, Ab-REM1, and Ab-REM2. Although the relationship between earnings thresholds and Ab-DISEXP is not significant, the negative relationship is as expected.

3.4 Classification of life-cycle stages

In Taiwan, firms applying to trade stocks on the TSEC or GTSM markets must meet specific requirements, such as capital stock, profitability, and the dispersion of shareholdings; meeting these requirements could indicate that a firm has moved from the introduction phase to the growth stage. Therefore, we employ the procedure developed by Anthony and Ramesh (1992) and implemented in Young and Huang (2004) and Lin et al. (2008) to classify firm-years into the growth, maturity, and decline stages.

The classification procedure begins by computing the financial life-cycle descriptors, percentage of sales growth (SG), and percentage of capital expenditures to the total value of the firm (CEV) for every firm-year as follows:

\[
SG_t = \left(\frac{S_t - S_{t-1}}{S_{t-1}}\right) \times 100, \quad (7)
\]

\[
CEV_t = \left(\frac{CE_t}{VALUE_t}\right) \times 100, \quad (8)
\]

where

- \(SG_t\) = sales growth during period \(t\)
- \(S_t\) = net sales during period \(t\)
- \(S_{t-1}\) = net sales during period \(t - 1\)
- \(CEV_t\) = the percentage of capital expenditures to the total value of the firm in period \(t\)
- \(CE_t\) = capital expenditures in period \(t\)
- \(VALUE_t\) = market value of the equity + book value of long-term debt at the end of period \(t\).

The prior five years’ median values (denoted as MSG and MCEV) of these two descriptors for each firm-year are used to identify life-cycle stages—that is, six years of data for every firm is required.

In addition to the financial descriptors listed above, we employ a non-financial life-cycle descriptor, firm age (AGE), to control for the direct relationship between the financial variables and firm risk.

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3 Although the significant upward shift near zero is absent in the distribution of scaled changes in earnings, there is no significant influence on the untabulated results of the checking procedure after deleting this criterion of earnings thresholds, indicating that, consistent with prior literature on earnings management, the firm-years with positive scaled earnings growth between 0 and 0.01 continue to exhibit a higher probability of earnings management.
Firm-years are ranked for each of the descriptors (MSG, MCEV, and AGE) in three stages, and the criteria in Table 1 generalized by Anthony and Ramesh (1992) are used to group each firm-year into different life-cycle stages. A score is assigned to every group of descriptors (0 for the growth stage, 1 for the maturity stage, and 2 for the decline stage). Finally, the sum of the individual descriptor scores is used to generate a composite score, which is used as an indicator (CYCLE) to complete the classification of various life-cycle stages. Composite scores between 0 and 1, 2 and 4, and 5 and 6 belong to the growth, maturity, and decline stages, respectively.

[Insert Table 1 Here]

4. Empirical Results

4.1 Descriptive statistics by life-cycle descriptors

According to the criteria generalized by Anthony and Ramesh (1992), firms in earlier stages exhibit higher MSG and MCEV and are younger in AGE. An untabulated result describes the mean values of life-cycle descriptors across different stages according to the level of each life-cycle descriptor. This mitigates inappropriate classification by using the levels of the aggregate indicator (CYCLE) to make life-cycle classifications. Furthermore, an analysis of variance (ANOVA) indicates significant differences between each descriptor among the three life-cycle stages, meaning that MSG, MCEV, and AGE effectively make life-cycle classifications.

We conduct an additional examination to present the mean values of five REM proxies in various stages according to the level of each life-cycle descriptor. According to prior studies, engaging in REM results in deviation from optimal operational activities (Roychowdhury 2006). This behavior may weaken the competitive advantages of firms in the growth stage and have severe economic consequences (Selling and Stickney 1989). We develop this notion as Hypothesis 1. The patterns of all the REM proxies across various stages are entirely consistent with Hypothesis 1, using the aggregate indicator (CYCLE) to make life-cycle classifications. This appears to mitigate inappropriate classifications, and the ANOVA indicates significant differences between each REM proxy in the three stages of the life cycle.

Chi-square tests indicated some clustering according to industry and time in various life-cycle stages (untabulated). For example, the electronics industry comprises 30.36% of the sample and textiles, chemicals, building materials and construction, and electronic equipment and services comprise more than 60% of the sample. As Black (1998) argues, macroeconomic conditions cause time clustering and further influence the corporate life cycle; the observations per year increase steadily from 1998 to 2002, and they grow faster from 2003 to 2006, when they comprise more than 60% of the sample.

4.2 Abnormal REM and life-cycle stages
The following equation is used to determine whether firms in different stages of their life cycle exhibit different forms of evidence related to the use of REM.

\[
\text{Abnormal REM}_t = \gamma_0 + \gamma_1 \text{CYCLE1}_t + \gamma_2 \text{ACCRUALs}_t + \gamma_3 \text{LEV}_{t-1} + \gamma_4 \text{SIZE}_{t-1} + \gamma_5 \text{MTB}_{t-1} + \gamma_6 \text{SE}_{t-1} + \\
\gamma_7 \text{ROA}_{t-1} + \epsilon_t,
\]

where

- \(\text{Ab-CFO}\) = abnormal levels of cash flow from operations, calculated as the residual estimated from Eq. (1)
- \(\text{Ab-PROD}\) = abnormal levels of production costs, calculated as the residual estimated from Eq. (4)
- \(\text{Ab-DISEXP}\) = abnormal levels of discretionary expenses, calculated as the residual estimated from Eq. (6)
- \(\text{Ab-REM1}\) = aggregated measure, calculated as the sum of the residuals from Eqs. (4) and (6) \times -1
- \(\text{Ab-REM2}\) = aggregated measure, calculated as the sum of the residuals from Eq. (1) \times -1 and Eq. (6) \times -1
- \(\text{CYCLE1}\) = indicative variable equal to one if the firm-year belongs to the growth stage, and otherwise zero
- \(\text{ACCRUALs}\) = abnormal accruals matched by performance, as suggested by Kothari et al. (2005)
- \(\text{LEV}\) = total liabilities divided by total assets
- \(\text{SIZE}\) = the natural logarithm of total assets
- \(\text{MTB}\) = market-to-book ratio
- \(\text{SE}\) = earnings changes scaled by total assets at the beginning of the period
- \(\text{ROA}\) = return on assets.

The five REM proxies described in Section 3.2 as dependent variables in Eq. (9)—SIZE, MTB, ROA, SE, and LEV—control for size, growth opportunities, operating performance, and variations in capital structure. Furthermore, because past studies have documented that firms treat REM and AEM as substitutes (Zang 2012; Cohen et al. 2008), we adopt ACCRUALs to control for the substitution effect.

Panel A of Table 2 presents descriptive statistics for the variables in Eq. (9). All REM proxies are Winsorized by 1% at the extremes to limit the influence of outliers. Panel B reports the Pearson correlations between variables, showing that the five REM proxies are highly correlated with SIZE, MTB, and ROA. Furthermore, considering the high correlation between SIZE, MTB, and ROA, we calculate variance inflation factors to ensure that Eq. (9) is free from collinearity problems (untabulated).

[Insert Table 2 Here]
A multivariate analysis of the relationship between various types of REM and life-cycle stages is reported in Table 3. Only the coefficients of MTB are consistent with predictions (Roychowdhury 2006); the coefficients of ACCRUALs show the concurrent adoption of AEM and REM rather than the substitution effect. Ab-CFO is positively associated with firms in the growth stage (CYCLE1) and is significant at the 1% level (coefficient 0.0124), consistent with Hypothesis 1. The coefficients of CYCLE1 are negatively associated with Ab-PROD and positively associated with Ab-DISEXP, consistent with the expected patterns of REM; however, these associations are not significant.

Furthermore, as described in Section 3.2, two aggregated measures, Ab-REM1 and Ab-REM2, are created to capture the total effects in cases in which different types of REM are simultaneously conducted (Cohen and Zarowin 2010). Ab-REM1 is created to capture the concurrent adoption of reducing discretionary expenses and overproducing to lower the cost of goods sold. Ab-REM2 is created to capture the effects of cutting discretionary expenses with sales manipulation. Both the coefficients of CYCLE1 are significantly negative (coefficient –0.0118, p < 0.1 for Ab-REM1; coefficient –0.0175, p < 0.01 for Ab-REM2) when Ab-REM1 or Ab-REM2 is the dependent variable, consistent with Hypothesis 1. The results suggest that firms tend to conduct less REM in the growth stage.

[Insert Table 3 Here]

The lack of significance of the coefficient in CYCLE1 with Ab-PROD or Ab-DISEXP as the dependent variable corresponds to the results of Roychowdhury (2006), who confirms that REM-suspected firms with higher MTB exhibit significantly higher Ab-PROD or lower Ab-DISEXP. This implies that firms with rosier prospects tend to engage in overproduction or discretionary expense cutting to achieve earnings benchmarks if REM is required.

4.3 Abnormal REM and future performance

To investigate the economic consequences of REM in different life-cycle stages, we employ the following equation.

\[
\text{Adj-ROA}_{t+i} (\text{Adj-CFO}_{t+i}) = \gamma_0 + \gamma_1 \text{CYCLE1} + \gamma_2 \text{CYCLE2} + \gamma_3 \text{REM}_t + \gamma_4 \text{CYCLE1} \times \text{REM}_t + \gamma_5 \text{CYCLE2} \times \text{REM}_t + \gamma_6 \text{Adj-ROA}_t + \gamma_7 \text{SIZE}_t + \gamma_8 \text{MTB}_t + \gamma_9 \text{RETURN}_t + \gamma_{10} \text{ZSCORE}_{t-1} + \epsilon_{t+1}, \quad i = 1, 2, \text{ and } 3,
\]

where

- ROA = return on assets
- Adj-ROA = industry-adjusted ROA equals the difference between the firm-specific and median ROA for the same year and industry
- CFO = cash flow from operations divided by total assets at the beginning of the period
Adj-CFO = industry-adjusted CFO equals the firm-specific ROA minus the median CFO for the same year and industry
CYCLE1 = an indicative variable equal to one if the firm-year belongs to the growth stage, and zero otherwise
CYCLE2 = an indicative variable equal to one if the firm-year belongs to the maturity stage, and zero otherwise
R-CFO = an indicative variable equal to one if the residual from Eq. (1) is in the lowest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, and zero otherwise
R-PROD = an indicative variable equal to one if the residual from Eq. (4) is in the highest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, and zero otherwise
R-DISEXP = an indicative variable equal to one if the residual from Eq. (6) is in the lowest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, and zero otherwise
T-REM1 = an indicative variable equal to one if the sum of the residuals from Eqs. (4) and (6) × −1 is in the highest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, and zero otherwise
T-REM2 = an indicative variable equal to one if the sum of the residuals from Eq. (1) × −1 and Eq. (6) × −1 is in the highest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, and zero otherwise
SIZE = the natural logarithm of total assets
MTB = market-to-book ratio
RETURN = size-adjusted abnormal returns computed as the difference between the yearly buy and hold raw return of the specific firm and the mean return for the same year- and size-matched decile portfolios of firms
ZSCORE = a measure of financial health computed as $3.3 \times \left(\frac{\text{Net Income}_t}{\text{Assets}_{t-1}}\right) + 1.0 \times \left(\frac{\text{Sales}_t}{\text{Assets}_{t-1}}\right) + 1.4 \times \left(\frac{\text{Retained Earnings}_t}{\text{Assets}_{t-1}}\right) + 1.2 \times \left(\frac{\text{Working Capital}_t}{\text{Assets}_{t-1}}\right)$.

In accordance with Gunny (2010), we use industry-adjusted ROA (denoted Adj-ROA) and industry-adjusted CFO (denoted Adj-CFO) as the dependent variables in Eq. (10), keeping SIZE, MTB, Adj-ROA, RETURN, and ZSCORE to control for the size, growth opportunities, operating performance, stock performance, and financial health of firms.

The economic consequences of REM in specific life-cycle stages are examined in Hypothesis 2. The coefficients of the two interaction terms (CYCLE1 × REM and CYCLE2 × REM) present the performance of the firms using REM in certain life-cycle stages relative to those in other stages.
Table 4 presents descriptive statistics about the operating performance of firms (i.e., Adj-ROA) categorized according to life cycle and REM type. It appears that, on average, firms using REM perform worse than non-REM firms. Furthermore, in all three stages of the life cycle, firms engaging in overproduction and discretionary expense cutting (i.e., R-PROD and R-DISEXP) perform better in the subsequent three years than firms conducting sales manipulations (i.e., R-CFO).

[Insert Table 4 Here]

Table 5 reports the Pearson correlations between variables. In accordance with Gunny’s (2010) examination, there is a strong correlation between Adj-ROA and SIZE, MTB, and ZSCORE, making the control variables meaningful. Furthermore, in light of the strong correlation between SIZE, MTB, and ZSCORE, variance inflation factors are calculated to ensure that Eq. (10) is free from collinearity problems (untabulated).

[Insert Table 5 Here]

A multivariate analysis of the economic consequences of REM across life-cycle stages is reported in Table 6. Generally, except for RETURN, the coefficients of Adj-ROA, MTB, and ZSCORE are consistent with the predicted signs (Gunny, 2010). Panel A presents the results using Adj-ROA as the dependent variable. The negative coefficients on REM ($\gamma_3$) for all three subsequent Adj-ROA show that engaging in REM may worsen subsequent operating performance. The coefficients of the interaction terms (CYCLE1 × REM and CYCLE2 × REM) indicate that only REM-suspected firms in the growth stage perform significantly better in the subsequent one-year Adj-ROA (coefficient 0.0225, $p < 0.1$) than firms in other stages, which is partially consistent with Hypothesis 2.1.

Panel B shows the results using Adj-CFO as the dependent variable. Except for the Adj-CFO in year t+3, REM has a significantly negative influence on subsequent performance. The coefficients of the interaction terms (CYCLE1 × REM and CYCLE2 × REM) show a positive but not significant influence of REM for firms in the growth and maturity stages on the subsequent Adj-CFO.

[Insert Table 6 Here]

Table 7 presents the average performance of firms engaging in REM relative to that of non-REM firms. The results suggest that, in the growth stage (CYCLE1), the negative influence of REM on average performance is significant until year t+2, but it is not significant in year t+3 in terms of both

---

4 Altman’s Z-score, modified by Mackie-Mason (1990), is employed here to control for the financial health of firms. The estimation of Eq. (10) is replicated without ZSCORE, and there is no significant influence on the untabulated results, as shown in Table 11.
Adj-ROA and Adj-CFO. The average performances in terms of Adj-ROA and Adj-CFO for REM-suspected firms in the growth stage (CYCLE1) are −9.75 and −16.33% ($\gamma_0 + \gamma_1 + \gamma_3 + \gamma_4$), respectively, in year t+2, which is lower than that of non-REM firms (−8.66 and −13.61%, $\gamma_0 + \gamma_1$). The p-values from an F-test (i.e., $\gamma_3 + \gamma_4 = 0$) are significant at the 10 and 5% levels on Adj-ROA and Adj-CFO, respectively, in year t+2, suggesting that in the growth stage, except for year t+2, there is little evidence that REM-suspected firms perform worse than non-REM firms.\(^5\)

As for firms in the mature stage (CYCLE2), the average performances by Adj-ROA of firms conducting REM are −13.61, −9.68, and −9.98% ($\gamma_0 + \gamma_2 + \gamma_3 + \gamma_5$) in years t+1, t+2, and t+3, respectively, which are lower than those of non-REM firms (−12.03, −8.00, and −8.50%, $\gamma_0 + \gamma_2$) for all three subsequent years. The p-values from an F-test (i.e., $\gamma_3 + \gamma_5 = 0$) are 0.0005, 0.0024, and 0.0635 for the subsequent three years, respectively, indicating that firms using REM perform worse than non-REM firms in the mature stage, consistent with the opportunistic incentive for managers to engage in REM (Hypothesis 2.2). The significance of Adj-CFO appears only in year t+2, and it is supported by an F-test (p-value is 0.0918).

[Insert Table 7 Here]

5. Conclusion

To maintain consistency with previous studies, REM-suspected firms are defined as the intersection of firms with abnormal levels of operating cash flow, production costs, or discretionary expenses and firms with asset-scaled earnings or asset-scaled earnings changes meeting the zero thresholds (Roychowdhury 2006; Gunny 2010). Furthermore, to provide insight into different life-cycle stages, we employ the classification developed by Anthony and Ramesh (1992).

Our empirical results show that firms in the growth stage exhibit less evidence of REM than firms in other stages, consistent with the fact that REM may result in severe economic consequences for firms in the growth stage (Selling and Stickney 1989; Zang 2012). With respect to the economic consequences of REM, our study suggests that firms engaging in REM generally perform worse than those that do not, consistent with the opportunistic intention of managers in conducting REM (Gunny 2005; Zang 2012; Cohen and Zarowin 2010), particularly for firms in the mature stage. Our results indicate that REM-suspected firms in the mature stage have lower Adj-ROA than non-REM firms in any of the subsequent three years. Furthermore, there is little evidence to show that firms in the growth stage that engage in REM have a higher Adj-ROA in the subsequent year than firms in other stages.

Although the aggregate life-cycle descriptor mitigates the problem of misclassification, limitations

\(^5\) In accordance with Leggett et al. (2009) and Gunny (2010), the Wald test is employed here to test whether the summed coefficients of interest are significantly different.
still exist. For example, certain types of firms in the growth stage exhibit higher sales growth and are younger, but lower capital expenditures might be misclassified in the mature stage, as in software or semiconductor companies.

Our results present interesting topics for future research. Existing studies on REM have focused on upward earnings manipulation. Investigating downward earnings manipulation may reveal another aspect of the subsequent economic consequences of REM.

Firms may use REM for different reasons, adopting it to varying degrees and with different effects on subsequent performance. Furthermore, existing research uses the attributes of firms to identify their life-cycle stages, including sales growth, capital expenditures, capital structure, sources of cash flows, and firm age (Anthony and Ramesh 1992). However, the fact that the life-cycle theory for firms or industries originated from the product life-cycle theory implies that it may be more precise in product life-cycle profiling. Selling and Stickney (1989) note that the life-cycle stage of a firm or an industry is represented by the average stage of its portfolio of products. That is, if a generalization of the product life-cycle theory is used to identify firms with multiple products, grouping firms according to the average stages of their products may further contribute to understanding the subsequent consequences of REM across various life-cycle stages.
References


Appendix A

Definition of Variables

Ab-CFO  abnormal cash flow from operations, calculated as the residual estimated from Eq. (1)
Ab-PROD abnormal production costs, calculated as the residual estimated from Eq. (4)
Ab-DISEXP abnormal discretionary expenses, calculated as the residual estimated from Eq. (6)
Ab-REM1 aggregated measure, calculated as the sum of the residuals from Eq. (4) and (6)*-1
Ab-REM2 aggregated measure, calculated as the sum of the residuals from Eq. (1)*-1 and (6)*-1
ACCRLUALS abnormal accruals matched by performance as suggested by Kothari et al. (2005)
LEV total liabilities divided by total assets
SIZE the natural logarithm of total assets
MTB market to book ratio
SE earnings changes scaled by total assets at the beginning of the period
ROA return on assets
Adj-ROA industry-adjusted ROA equals the difference between the firm-specific ROA and the median ROA for the same year and industry
CFO cash flow from operations divided by total assets at the beginning of the period
Adj-CFO industry-adjusted CFO equals the firm-specific ROA minus the median CFO for the same year and industry
CYCLE1 indicative variable equal to one if the firm-year belongs to the growth stage, zero otherwise
CYCLE2 indicative variable equal to one if the firm-year belongs to the maturity stage, zero otherwise
CYCLE3 indicative variable equal to one if the firm-year belongs to the decline stage, zero otherwise
Non-REM indicative variable equal to one if the residual from Eq. (1), (4), or (6) is in the quintiles inconsistent with REM and scaled earnings or scaled earnings growth is between 0 and 0.01, zero otherwise
R-CFO indicative variable equal to one if the residual from Eq. (1) is in the lowest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, zero otherwise
R-PROD indicative variable equal to one if the residual from Eq. (4) is in the highest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, zero otherwise
R-DISEXP indicative variable equal to one if the residual from Eq. (6) is in the lowest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, zero otherwise
T-REM1 indicative variable equal to one if the sum of the residuals from Eq. (4) and (6)*-1 is in the highest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, zero otherwise
T-REM2 indicative variable equal to one if the sum of the residuals from Eq. (1)*-1 and (6)*-1 is in the highest quintile and scaled earnings or scaled earnings growth is between 0 and 0.01, zero otherwise
RETURN size adjusted abnormal returns computed as the difference between the yearly buy and hold raw return of the specific firm and the mean return for the same
year and size matched decile portfolio of firms

\[ ZSCORE = \text{measure of financial health computed as: } 3.3\left(\frac{\text{Net income}_t}{\text{Assets}_{t-1}}\right) + 1.0\left(\frac{\text{Sales}_t}{\text{Assets}_{t-1}}\right) + 1.4\left(\frac{\text{Retained Earnings}_t}{\text{Assets}_{t-1}}\right) + 1.2\left(\frac{\text{Working Capital}_t}{\text{Assets}_{t-1}}\right) \]
Table 1
Expectations for lifecycle descriptors

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<tr>
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<tr>
<td>Decline</td>
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<td>Low</td>
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Notes to Table 1:
Refer to Anthony and Ramesh (1992).
Table 2
Descriptive statistics of REM and CLC

Panel A: Descriptive statistics of variables in Eq. (9)

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<th>Median</th>
<th>3rd quartile</th>
<th>Skewness</th>
<th>Kurtosis</th>
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Panel B: Pearson correlation matrix

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<th>Ab-DISEXP</th>
<th>Ab-REM1</th>
<th>Ab-REM2</th>
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<th>LEV</th>
<th>SIZE</th>
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Notes to Table 2:
* p<0.05
Ab-CFO, Ab-PROD, Ab-DISEXP, and Ab-TREM are winsorized by 1 percent at the extremes to avoid the influence of outliers; the variables are defined in appendix A.
Table 3
Cross-sectional equations relating abnormal residuals to firms in different life cycles
Abnormal REM$_t$ = $\gamma_0 + \gamma_1$CYCLE1 + $\gamma_2$ACCRUAL$+$ $\gamma_3$LEV$_{t-1}$ + $\gamma_4$SIZE$_{t-1}$ + $\gamma_5$MTB$_{t-1}$ + $\gamma_6$SE$_{t-1}$ + $\gamma_7$ROA$_{t-1}$ + $\epsilon_t$  

\[
\begin{align*}
\text{Intercept} & : -0.0829, (5.00)*** \\
\text{CYCLE1} & : 0.0124, (4.01)*** \\
\text{ACCRUAL$+$} & : -0.5454, (-51.66)*** \\
\text{LEV} & : -0.0207, (-2.92)*** \\
\text{SIZE} & : -0.0048, (-3.87)*** \\
\text{SE} & : -0.0425, (-3.46)*** \\
\text{MTB} & : 0.2649, (8.54)*** \\
\text{ROA} & : 0.2311, (13.67)*** \\
\text{Industry Dummies} & : Yes \quad \text{Year Dummies} \quad \text{Yes} \\
N & : 3213 \\
\text{adj. } R^2 & : 0.524
\end{align*}
\]
Table 4
Descriptive statistics of observations categorized by CLC and REM

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<th>Mean</th>
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<th>Adj-ROA_{t-1}</th>
<th>Adj-ROA_{t-2}</th>
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<th>Adj-ROA_{t-4}</th>
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<th>Adj-ROA_{t-1}</th>
<th>Adj-ROA_{t-2}</th>
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<th>Adj-ROA_{t-1}</th>
<th>Adj-ROA_{t-2}</th>
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<th>Adj-ROA_{t-4}</th>
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Notes to Table 4:
The variables are defined in appendix A.
Table 5  
Pearson correlation matrix

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<th>CYCLE2*REM</th>
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<th>ZSCORE</th>
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Notes to Table 5:  
*p<0.05  
The variables are defined in appendix A.
Table 6
Cross-sectional equations relating subsequent performance to REM in different life cycles

\[
\text{Adj-ROA}_{t+i} (\text{Adj-CFO}_{t+i}) = \gamma_0 + \gamma_1 \text{CYCLE1} + \gamma_2 \text{CYCLE2} + \gamma_3 \text{REM}_t + \gamma_4 \text{CYCLE1} \times \text{REM}_t + \gamma_5 \text{CYCLE2} \times \text{REM}_t + \gamma_6 \text{Adj-ROA}_t + \gamma_7 \text{SIZE}_t + \gamma_8 \text{MTB}_t + \gamma_9 \text{RETURN}_t + \gamma_{10} \text{ZSCORE}_{t-1} + \epsilon_{t+i} \quad i=1,2,3
\]

### Panel A: Industry-adjusted return on assets

<table>
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<th>Pred.</th>
<th>Sign</th>
<th>Adj-ROA(_{t+1})</th>
<th>Adj-ROA(_{t+2})</th>
<th>Adj-ROA(_{t+3})</th>
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<td>(-3.80)***</td>
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Table 6  
(continued)

Panel B: Industry-adjusted cash flow from operations

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Notes to Table 6:
* p<0.1, ** p<0.05, *** p<0.01
$t$ statistics in parentheses
The variables are defined in appendix A.
# Table 7

Average performance of REM

<table>
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<th>CYCLE 1</th>
<th>Period</th>
<th>ROA Coefficient</th>
<th>F-test P-value</th>
<th>CFO Coefficient</th>
<th>F-test P-value</th>
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<tr>
<td>REM-suspected firms</td>
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<tr>
<td>Difference (γ3+γ4)</td>
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<td>-0.0975</td>
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<td>-0.0866</td>
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<tr>
<td>Difference (γ3+γ4)</td>
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<td>-0.0272</td>
<td>0.0135**</td>
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<td>REM-suspected firms</td>
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<td>-0.1490</td>
<td>Non-REM firms</td>
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<tr>
<td>Difference (γ3+γ5)</td>
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<td>0.0024***</td>
<td>-0.0062</td>
<td>0.0918*</td>
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<td>Difference (γ3+γ5)</td>
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</table>

**Notes to Table 7:**
* p<0.1, ** p<0.05, *** p<0.01