Journal of Accounting Literature 41 (2018) 75–88

Contents lists available at ScienceDirect

Journal of Accounting Literature

journal homepage: www.elsevier.com/locate/acclit

Is earnings management sensitive to discount rates?

Jesper Haga[a], Kim Ittonen[b], Per C. Tronnes[c,*], Leon Wong[c]

[a] Hanken School of Economics, P.O. Box 287, 65101 Vasa, Finland
[b] Hanken School of Economics, P.O. Box 479, 00101 Helsinki, Finland
[c] University of New South Wales, UNSW Sydney NSW 2052, Australia

ARTICLE INFO

Keywords:
Earnings management
Accruals
Real activities manipulation
Discount rates

ABSTRACT

We argue that managers' choice to manage earnings depends on the trade-off in the present value of expected future net benefits associated with that choice. Specifically, we examine if discount rates are associated with the likelihood that managers engage in earnings management to meet or beat various earnings targets. We find that discount rates are positively associated with income-increasing earnings management. This means that managers increase both accrual-based and real earnings management when discount rates are higher. However, the economic magnitude of this association is relatively moderate.

1. Introduction

This paper examines whether managers' decisions to engage in income-increasing earnings management are sensitive to discount rates. Rational managers are expected to pursue and favor strategies that maximize their own gains, even at the expense of other stakeholders (Jensen & Meckling, 1976). Financial reporting provides one way to serve self-interests, particularly when information asymmetry exists between users and providers of the reports. Managers can take accounting or real economic actions to manage short-term performance and, consequently, serve self-interests e.g. by triggering earnings-based performance compensation (Gaver, Gaver, & Austin, 1995; Healy, 1985; Holthausen, Larcker, & Sloan, 1995; Watts & Zimmerman, 1986) to meet capital market expectations (Eames, 1998) or prior to IPOs (Teoh, Welch, & Wong, 1998).

There is considerable empirical evidence showing that managerial self-interests affect their decision horizon. For example, CEOs respond to personal earnings-based incentives by engaging in short-term performance-enhancing activities, rather than long-term value creation that would benefit shareholders (Bergstresser & Philippon, 2006; Dechow & Sloan, 1991). Similarly, shorter expected CEO tenure has been associated with higher agency costs, lower earnings quality, and greater probability of information-based trading, providing evidence that shorter decision horizons motivate managers to invest in projects with quicker payback (Antia, Pantzalis, & Park, 2010; Gopalan, Milbourn, Song, & Thakor, 2014).

The purpose of this paper is to examine whether discount rates affect rational managers' decisions to manage earnings for a given decision horizon. To increase current earnings managers may exercise their discretion over accruals or real business decisions. The use of income-increasing accruals-based earnings management or real earnings management to inflate earnings is a short-horizon strategy because of two factors: 1) the reversal of discretionary accruals and real consequences of operational decisions, and 2) managers' reputation risk. First, using accounting discretion related to income-increasing accruals in the current period constrains the ability to manage accruals in the same direction in future periods (Baber, Sok-Hyon, & Ying, 2011; Barton & Simko, 2002; DeFond & Park, 2001). That is, accruals must reverse at some point (Rangan, 1998), unless managers employ even more aggressive earnings

* Corresponding author at: Australian School of Business, UNSW Australia, School of Accounting, UNSW Sydney 2052, Australia.
E-mail addresses: jesper.haga@hanken.fi (J. Haga), kim.ittonen@hanken.fi (K. Ittonen), p.tronnes@unsw.edu.au (P.C. Tronnes), leon.wong@unsw.edu.au (L. Wong).

https://doi.org/10.1016/j.acclit.2018.03.001
Received 10 September 2014; Received in revised form 16 February 2018; Accepted 6 March 2018
Available online 16 March 2018

management. Similarly, increasing earnings with real business actions is also a short-horizon strategy (Cohen & Zarowin, 2010). Earnings management by real business actions, for example via channel-stuffing increase current cash flow by bringing forward future cash flows. Second, both earnings management strategies are likely to alert analysts, auditors and the press. This increases the risk of reputation loss and labor-market disciplining and pose a threat for managers' future net benefits (Brickley, Linck, & Coles, 1999; Davidson, Xie, Xu, & Ning, 2007; Kaplan, McElroy, Ravenscroft, & Shrader, 2007).

Building on the expectations related to managerial self-serving behaviour and income-increasing earnings management, we hypothesize that a rational manager has greater incentives for short-termism (upwards earnings management) when the discount rates are higher. Using the theoretical model by Buchholz (1988) which invokes game theory and present value analysis, we argue that the choice between reporting true or managed earnings depends on the present value of the expected net benefits attached to those two choices. Expected future benefits from higher earnings from upward earnings management have a short time-horizon imposed by accrual reversal and the economic consequences of real earnings management. Conversely, expected future costs have a long time-horizon; evidence of earnings management or manipulation or even fraud may be discovered long after the CEO has resigned or retired, with lawsuits and criminal prosecution with financial and reputational losses crystalizing losses far in the future. The benefit horizon is short-term (because it is constrained by accrual reversal and cash flow pull-forward) but the cost horizon is long-term (because discovery may be years in the future).

For managers the choice of acting dishonestly involves estimating the net benefits of higher payoffs from earnings managed upwards minus the costs of discovery. On the other hand, the choice of acting honestly involves estimating the benefits of the lower payoffs from unmanaged (and thus lower) earnings, but without the costs of discovery. Given the two different horizon periods for benefits and costs, higher rates will discount costs substantially more than benefits, which may result in a greater net benefit from acting dishonestly relative to acting honestly. Conversely, when rates are zero, there will be no discounting of costs nor benefits, which may result in a lower net benefit (or cost) for acting dishonestly relative to acting honestly. We therefore, expect higher discount rates to be associated with more income-increasing earnings management, if managers act to maximize their wealth.

Our empirical results confirm a positive association between discount rates and income-increasing accruals and real earnings management, also in settings with high managerial incentives (benchmark beating). The coefficients suggest that the economic magnitude of this effect is moderate, a one standard deviation change in the discount rate increases accrual-based and real earnings management by less than one percent of total assets. This is consistent with Evans, Hannan, Krishnan, and Moser (2001), who suggest that large payoffs are needed before managers will sacrifice their integrity. The existence of "partially honest" reports can be evidence of a trade-off model, in which individuals balance wealth maximization, honesty and reputation. Overall, our paper suggests that discount rates influence earnings management when managers have incentives to meet or beat earnings benchmarks. We supplement our empirical findings with a simulation.

We provide several possible explanations for our findings. The most obvious reason, as we show in a simulation, is probably because managers consider that honesty pays in most cases. Second, actual and perceived apprehension rates and reputational costs are most likely to be high enough to have a significant deterrent effect on earnings management and decrease the present value of acting dishonestly. This explanation is supported by previous research on the trade-off model (Evans et al., 2001; Luft, 1997), in which managers are only willing to use low or moderate levels of earnings management to increase wealth, but not to the extent that they will risk their reputation. Third, discount rates are usually low enough to ensure the excess profits from dishonest short-term actions are moderate. Baiman and Lewis (1989) suggest that individuals have a high pay-off threshold that must be reached before wealth maximization overtakes honesty. Therefore, the discount rates alone may not generally provide a strong incentive to engage in earnings management. Finally, attaining a senior management position in a large public corporation probably demands long-term commitment, and individuals with a short-term focus are less likely to be promoted.

We contribute to the literature by showing that in addition to investor sentiment (Simpson, 2013), managers respond to other economy-wide factors such as higher discount rates when considering earnings management. Second, our findings contribute to the literature by extending Kang, Liu, and Qi (2010) in documenting a positive firm-level association between earnings management and discount rates in addition to one-year ahead market returns. Third, our paper extends Buchholz (1988) by explicitly incorporating cost to dishonesty in the model; and fourth, utilizes the model to provide a theoretical underpinning to the recent findings on the association between managers' decision horizon and corporate decision making (Antia et al., 2010; Dechow & Sloan, 1991; Gopalan et al., 2014).

2. Background

This paper examines the association between earnings management and discount rates. Substantial evidence exists documenting that management engage in earnings management by managing accruals or real activities.[1] Managerial myopia has been reported as a key driver of earnings management. For example, managers have been found to overstate earnings to meet capital market expectations (Eames, 1998) and prior to IPOs (Eames, 1998; Teoh et al., 1998) – only to underperform in the following periods due to accrual reversal (Rangan, 1998) or face subsequent detrimental real consequences of operational decisions. Furthermore, direct proxies for CEO short-termism, such as CEO tenure (Ali & Zhang, 2015; Antia et al., 2010), compensation structure (Bergstresser & Philippon, 2006) and contractual protection (Chen, Harford, & Lin, 2015) are strongly associated with earnings management.

This paper tests the association between managerial myopia and discount rates. Buchholz (1988) suggests in a theoretical model

[1] See Healy and Wahlen (1999) and Dechow, Ge, and Schrand (2010) for reviews.

that the choice between dishonesty and honesty is a function of the trade-off between the present value of the expected net benefits. We specify a modified Buchholz (1988) model as:

$$\sum_{t}^{k=0} \frac{(1-p)(Bd) - p(Cd)}{(1+r)^k} = \frac{(Bh)}{r} \quad (1)$$

where p is the probability of being punished by the law, Bd is the (nominal) benefit of dishonesty (reporting manipulated earnings), Cd is the potential cost associated dishonesty when apprehended, r is the discount rate, t is the number of transactions (years), and Bh is the benefit of honesty (reporting actual earnings).[2] Essentially, Buchholz's model suggests that managers will act as if they assess the probability of getting away with dishonest reporting in the future. Buchholz's (1988) model is a necessary simplification of a complex reality, but it does illustrate that the choice between honest and dishonest reporting considers both the future and the present value of net benefits.

In Buchholz's (1988) simplified model the Left-Hand-Side (LHS) term represents the present value of the net benefit of being dishonest, where both the benefit of dishonesty (reporting manipulated earnings) and the potential cost associated with apprehension such as decreased or loss of future salaries due to reputation loss and labor-market disciplining as well as any costs of criminal charges that may come from lawsuits and criminal prosecution. If the probability (p) of being caught is high (such that (1-p) is low), the probability of succeeding in the dishonest act is low, and the net benefits of dishonesty are diminished. As such, the net benefits of dishonest reporting is necessarily a function of the benefits expected to be obtained if successful and the cost associated with being caught. Further, the term t represents the length of time it takes before dishonest reporting is likely to be uncovered. Unlike the benefits to honest reporting on the RHS, it is assumed that the reversing nature of manipulated earnings effectively impose a limit to the value of t before such practices are exposed.

The Right-Hand-Side (RHS) term represents the present value of the benefit of being honest. It does not have a t term because we assume that honest reporting can continue to be performed in perpetuity. Furthermore, we assume that the cost of reporting earnings honestly is negligible. Only if the LHS is greater than the net benefits than the RHS, will it pay off for managers to engage in dishonest reporting.

The notion that the time horizon for dishonest acts is finite is very relevant to our context because of the accrual reversal (Rangan, 1998; Teoh et al., 1998), the real consequences of operational decisions made to manage earnings (Cohen & Zarowin, 2010) and the reputational risk of aggressive earnings management (Desai, Hogan, & Wilkins, 2006). Indeed, each consecutive year of upward earnings management makes it more difficult to continue managing earnings upwards, and real earnings management will pull forward cash flow to the detriment of future year's cash flow. Thus, managing earnings upward by using income-increasing earnings management (accrual or real) is a short-term managerial strategy that pays over a finite time horizon, compared to acting honestly and not managing earnings, which would be a long-term strategy that pays over an infinite time horizon.

As, the LHS has a shorter time horizon than the RHS, an increase in the discount rate will therefore reduce the present value of net benefits of managers that report actual earnings more than it will reduce the present value of net benefits of managers that report manipulated earnings.

Extant research provides support to this line of thinking. First, previous studies suggest that managerial short-termism is associated with the state of the economy and, consequently, managers are more likely to engage in fraudulent behaviour (Wang, Winton, & Yu, 2010) and earnings management (Strobl, 2013) when beliefs about business conditions are higher. In papers closely related to ours, Kang et al. (2010), Guo and Jiang (2011) and Simpson (2013) examine the association between earnings management and market conditions. Kang et al. (2010) and Guo and Jiang (2011) find evidence that aggregate accruals are positively related to future market returns, which, according to Kang et al. (2010), is driven by the discretionary accruals rather than normal accruals. Simpson (2013) takes this analysis to the firm-level, examining the association between firm-level earnings management and investor sentiment. The findings suggest that managers use earnings management strategically more when investor sentiment is higher.

Our paper builds on the theoretical model of Buchholz (1988) and above empirical findings of the conditions or context that incentivize management to engage in earnings management, by examining the association between managerial myopia, measured by earnings management, and discount rates. Consequently, we expect that strategic managerial decisions are driven by the present value of expected future benefits. Therefore, managerial myopia and earnings management increase when discount rates are higher.

3. A simple simulation

There are many unobservable factors that work as inputs into Eq. (1), and their true values are largely unknown. As such, we conduct a simulation to evaluate the outcome of Eq. (1) using various values for the inputs: (i) apprehension rates (p); (ii) number of years the managers think they can get away with dishonest behaviour (t); (iii) the discount rate (r); (iv) the yearly nominal benefits from dishonest behaviour over honest behaviour (Bd-Bh); and (v) the yearly nominal benefits dishonest behaviour in comparison to the potential cost of dishonest behaviour (Bd-Cd). The input into the simulation analysis is provided in Table 1, Panel A.

[2] We have modified the numerator on the left hand side of Buchholz (1988) Buchholz's (1988) model to include a term to account for the potential costs if apprehended. Even so, as Buchholz (1988) also note on page 187, this model is simpler than what it could be. For example, growth rates could also be added to both the right and left hand side. Nevertheless, while the model is simple, it allows us to illustrate the role of discount rates within the context of earnings management in general, without forcing us of being too specific about the particular details of earnings management that may vary from case to case. Evans et al. (2001) also suggest that honesty is a continuum, where managers may also produce reports that are "partially honest".

Table 1
Simple Simulation.

Panel A: Simulation Input

Variables	p (%)	r (%)	Bd-Cd ($)	Bd-Bh ($)	t (yrs)
Type of variable	continuous	continuous	continuous	continuous	discrete
min (a)	0.01	0.01	0	0	0
max (b)	99.99	15.00	100	100	6
probability distribution	uniform	uniform	uniform	uniform	uniform
expected value ((a+b)/2)	50.0	7.5	50.0	50.0	3.0

Note: Bd = $100 in all trials.

Panel B: Input Distributions after 100,000 simulations

	p (%)	r (%)	Bd-Cd ($)	Bd-Bh ($)	t (yrs)
Average	50.17	7.48	49.06	48.94	2.991
10th percentile	10.90	1.47	9.10	8.75	0
25th percentile	25.64	3.73	24.08	23.85	1
Median	50.33	7.49	49.16	49.02	3
75th percentile	74.63	11.24	74.01	73.98	5
90th percentile	89.25	13.49	88.93	88.99	6

Panel C: Output Distributions after 100,000 simulations

	PVBd	PVBh	PVBh-PVBd
Average	85.22	6285.89	6200.67
10th percentile	−128.61	146.86	41.81
25th percentile	−23.64	347.02	263.88
Median	68.18	681.51	617.74
75th percentile	195.08	1369.97	1306.92
90th percentile	332.69	3459.03	3372.78

% of chases where PVBh is greater than PVBd: 92.205%.

In our simulation, we assume that the nominal benefit of acting honestly (*Bh*) is always less than the benefit of acting dishonestly (*Bd-Bh*).[3] While not necessarily a reflection of reality, but in order to make our simulation more tractable, we also assume the nominal potential cost of acting dishonest to be less than the nominal benefit of acting dishonest (*Bd-Cd*). We let the remaining variables in our model take on random values between specified minimum and maximum figures. For the probability of apprehension (*p*), we let the minimum value be 0.01% and the maximum be 99.99%. For discount rates (r), we let the minimum value be 0.01% and the maximum be 15.00%. For the difference in nominal benefits between acting honestly and dishonestly in nominal terms (*Bd-Bh*), we let the minimum value be $0 and the maximum be $100 (or the minimum difference is 0 percentage points and the maximum is 100 percentage points). Similarly, for the difference in between the nominal benefits and the potential cost of acting dishonestly (*Bd-Cd*), we let the minimum value be $0 and the maximum be $100 (or the minimum difference is 0 percentage points and the maximum is 100 percentage points). For the number of successive years the manager thinks they can get away with acting dishonestly, we set the minimum value to 0 (one time only) and the maximum value to 6 (seven years in a row). Probability of apprehension (*p*), discount rate (*r*), and difference in benefits between acting honestly and dishonestly in nominal terms (*Bd-Bh*) as well as the difference between the benefits and the potential cost of acting dishonestly *(Bd-Cd)* are continuous variables, whereas the number of times (*t*) is a discrete variable. We generate 100,000 observations, and for each *i*, we draw a random uniform number for each of the five variables (*p*, *r*, *Bd-Bh*, *Bd-Cd, t*) and calculate both the present value of the net benefit acting honestly (*PVBh*) and the present value of the net benefit acting dishonestly (*PVBd*).

In Table 1, Panels B and Panel C detail the distribution of the inputs, along with the outputs from our 100,000 simulations of Eq. (1). The average of the present value of acting honestly (*PVBh*) is $6285.89, whereas the average of the present value of acting dishonestly (*PVBd*) is much lower at $85.22. In 92.205% of cases, the present value of acting honestly (*PVBh*) is greater than the present value of acting dishonestly (*PVBd*). Panels A–E in Fig. 1 reveal the relationship between the values of the input variables and the output of Eq. (1) in more detail.

Although this simulation is simple, Fig. 1 still provides some interesting insights. The main insight is that there must be favourable conditions for managers to act dishonestly and use income-increasing earnings management to gain benefits. First, there must be a large discrepancy between the nominal benefits of being honest and the nominal benefits of being dishonest (Panel A). If little is to be gained by using income-increasing earnings management, this does not appear to be a rational choice. Consequently, earnings management seems much more likely in high incentive settings, e.g. to beat benchmarks. Interestingly, difference between the

[3] If the net benefits of acting honestly (*Bh*) exceed the net benefits of acting dishonestly (*Bd-Cd*), there is no rational need to consider acting dishonestly.

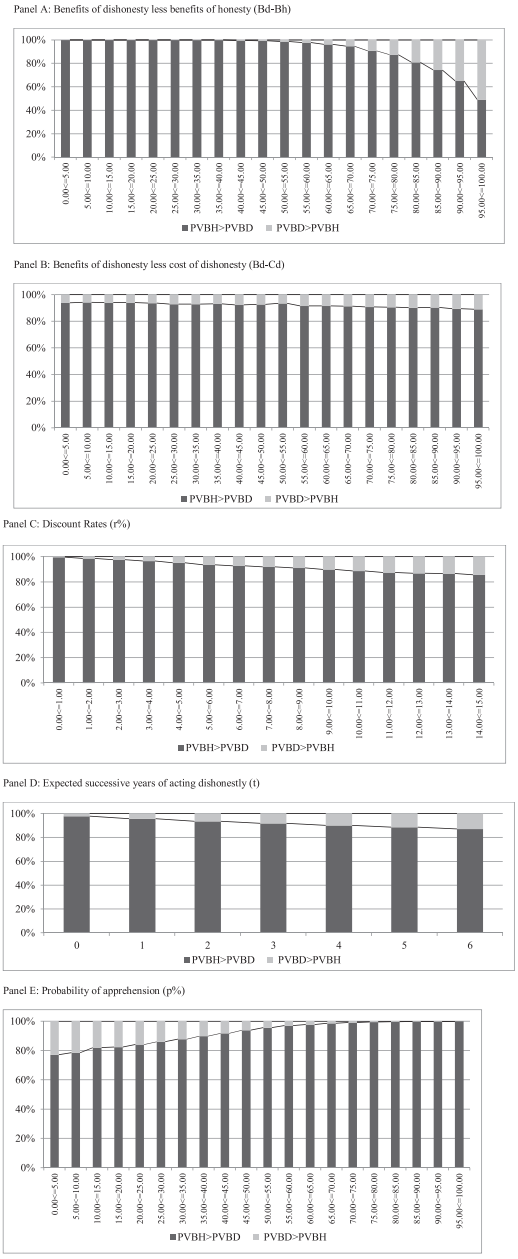

Fig. 1. Simulation Outcomes.

Result obtained after generating 100,000 observations. All panels detail the percentage (%) of cases in which the present value of net benefits of acting dishonestly outweighs the present value of the net benefits of acting honestly (PVBd > PVBh) and the cases in which it does not (PVBd < PVBh). The results with respect to the discrepancy between the nominal benefits of being dishonest and the benefits of being honest ((*Bd-Bh*) are detailed in Panel A; The results with respect to the discrepancy between the nominal benefits of being dishonest and the cost of being dishonest (*Bd- Cd*) are detailed in Panel B; discount rates (*r*) in Panel C: expected successive years (*t*) in Panel D; and apprehension rates (*p*) in Panel E.

nominal benefits of being dishonest and honest in (Panel A) seems to matter more than the differences between the benefits and potential cost of acting dishonestly (Panel B). Second, and most relevantly to our research question, managers must discount the future at high rates if income-increasing accruals are to pay-off (Panel C). Third, managers must think they can continue to use income-increasing earnings management to obtain the dishonest gains over quite a few years before it becomes unprofitable to be dishonest (Panel D). Being dishonest in a single time-period only is usually not going to provide a sufficient pay-off over being honest. Finally, the actual or perceived apprehension rate must be low (Panel E). Importantly, it appears that some favourable combination of those factors must be present before managers can rationally contemplate managing earnings by income-increasing accruals. In other

words, this simple simulation of the Buchholz (1988) model suggests that in most cases it pays to be honest rather than to dishonestly use income-increasing earnings management.

4. Data and empirical methodology

4.1. Data and earnings management measures

The data for estimating the earnings management measures and firm-specific control variables is obtained from Compustat North America and covers firms from 1988 to 2015.[4] Interest rate data and price index data is obtained from the Federal Reserve Board economics data series (FRED). Firms in the financial industry (GICS 6000 to 6999) and firm-year observations with missing data to calculate our variables are removed. All our variables are winsorized at the top and bottom 0.5%. The final sample consists of 61,439 firm-year observations.

We analyze whether, and to what degree, managers' choice to engage in earnings management is influenced by the rate at which they discount the future. As proxy for the discount rate, we use the Federal Reserve ten-year treasury constant maturity rate (*DISCRATE*).

We investigate two types of earnings management, the discretion over accruals and real business decisions. First, to estimate the accrual-based earnings management, we consider an annual version of the quarterly model proposed by Collins, Pungaliya, and Vijh (2017). This model extends the Kothari, Leone, and Wasley (2005) performance-adjusted accruals model by also adjusting for firm growth. In the regression model, total accruals are a linear function of the change in revenues (ΔREV_{it}), property, plant and equipment (PPE_{it}), return of assets (ROA_{it}) and change in ($\Delta SALES_{it}$)sales

$$\frac{ACC_{it}}{A_{it}} = \alpha_0 + \beta_1 \frac{1}{A_{it}} + \beta_2 \frac{\Delta REV_{it}}{A_{it}} + \beta_3 \frac{PPE_{it}}{A_{it}} + \beta_4 \frac{ROA_{it}}{A_{it}} + \beta_5 \frac{\Delta SALES_{it}}{A_{it}} + \varepsilon_{it}. \tag{2}$$

Where ACC_{it} is the total accruals for firm i at time t and A_{it-1} is the lagged total assets at the end of period t. The residual $(\widehat{\frac{ACC_{it}}{A_{it}}} - \frac{ACC_{it}}{A_{it}})$ from Eq. (2) is our measure of accrual-based earnings management (*ABACC*). Furthermore, we use the absolute value of the residual as a proxy for earnings quality ($|ABACC|$).

Second, to measure real earnings management, we follow Roychowdhury (2006) and estimate abnormal cash flow. As in Kim, Kim, and Zhou (2017), we rely solely on abnormal cash flow to measure real earnings management.[5] This measure is designed to capture sales manipulation. For instance, to increase sales firms may offer price discounts and more lenient credit terms. Such actions have a larger positive impact on sales than on cash flow, resulting in abnormally low operating cash flow. Following Dechow, Kothari, and Watts (1998) and Roychowdhury (2006), we express the normal level of cash flow from operations as a linear function of sales and the change in sales in the current period. Formally, the abnormal cash flow from operation (*ACFO*) is the residual $\left(\widehat{\frac{CFO_{it}}{A_{it-1}}} - \frac{CFO_{it}}{A_{it-1}}\right)$ from the following model:

$$\frac{CFO_{it}}{A_{it-1}} = \alpha_0 + \beta_1 \frac{1}{A_{it}} + \beta_2 \frac{SALES_{it}}{A_{it}} + \beta_3 \frac{\Delta SALES_{it}}{A_{it}} + \varepsilon_{it} \tag{3}$$

where CFO_{it} is the cash flow from operations and $SALES_{it}$ the sales for firm i during period t.

We estimate both earnings management measures by yearly cross-sectional regressions. For each year, we run separate regression for every industry (2-digit SIC level), with at least 15 observations. To ease the interpretation of our results, we present the earnings management measures in a way that positive numbers indicate income-increasing earnings management. To achieve this, we multiply *ACFO* with negative one. The aim is to use these measures to test our expectation that managers engage in more earnings management during times with higher discount rates.

4.2. Regression models

In this section, we present the empirical specifications for our regressions. We begin by investigating whether the discount rate affects earnings quality. We regress the absolute values of the earnings management measures ($|ABACC|$ and $|ACFO|$) on our variable of interest, *DISCRATE* (the discount rate), and numerous control variables. We estimate the following regression:

$$\begin{aligned} |ABACC_{it}| or |ACFO_{it}| = {} & \alpha_0 + \beta_1 DISCRATE_t + \beta_2 AGE_{it} + \beta_3 BM_{it} + \beta_4 SIZE_{it} + \beta_5 GROWTH_{it} + \beta_6 INDGROWTH_{it} + \beta_7 OPCYCLE_{it} \\ & + \beta_8 VOLSALES_{it} + \beta_9 PBANK_{it} + \beta_{10} BIGN_{it} + \beta_{11} GDPGROWTH_t + \beta_{12} INF_t + \beta_{13} MINDEX_t + \varepsilon_{it} \end{aligned} \tag{4}$$

We use firm-specific control variables as well as macroeconomic control variables. To control for differences related to firms' life

[4] The dependent variable in the real earnings management estimation (Roychowdhury, 2006) is cash flow from operations. Consequently, our sample is restricted to the post-1986 period due to the availability of cash flow statement data.

[5] Roychowdhury (2006) highlights that price discounts, channel stuffing and overproduction all decrease the cash flow from operations. As a result, abnormal cash flow captures in addition to sales manipulation also partially manipulation by overproduction. We do not examine real earnings management through reducing discretionary expenses because the discount rate has a larger impact on the net present value of such activities than on the managers' willingness to manipulate earnings.

cycles we include *AGE*, the number of years that the firm has been listed, (Myers, Myers, & Omer, 2003). *SIZE*, the log of firm's total assets, is included as a measure of firm size.[6] Prior studies have also highlighted that growth firms in specific industries may report systematically different level of accruals (Myers et al., 2003) and, therefore, *INDGROWTH*, one-year growth in two-digit GIC industry-sector total assets, is included in the model. To capture different accruals behaviour in firms with high and low growth opportunities (Carey & Simnett, 2006), we include a firm-specific growth measure, *GROWTH*, which is calculated as one-year growth in the firm's total assets. *PBANK*, a measure of the firms' probability of bankruptcy[7] is included to control for financial distress (e.g. Franz, HassabElnaby, & Lobo, 2014). Financial distress may constrain firms' possibilities to use real earnings management. *BIGN* is included to control for any differences between types of audit firms' abilities to restrict accrual-based earnings management (e.g. Becker, Defond, Jiambalvo, & Subramanyam, 1998). To control for the possibility that our proposed relationship is affected by macro-economic factors, we add macroeconomic control variables, such as anticipated GDP growth (*GDPGROWTH*), inflation (*INF*) and market-wide consumer sentiment (*MINDEX*). In addition to investigating the relationship between absolute values of the earnings management and the discount rate, we run separate Tobit regressions of Eq. (4) for firm-year observations with income-increasing and income-decreasing earnings management values.

In our main regressions, we use all control variables from Eq. (4), but in order to capture the earnings management behaviour we focus on settings where clear incentives to manage earnings exists. We emphasize two incentives: the zero earnings target and the last year's earnings target. According to Graham, Harvey, and Rajgopal (2005), most managers are prepared to manage earnings to beat various earnings targets. More specific, Burgstahler and Dichev (1997) find that managers engage in earnings management to avoid earnings decreases and losses. Our focus on annual earnings instead of quarterly earnings is justified by the fact that low quarterly earnings may be attributed to seasonality in the business (Roychowdhury, 2006). Moreover, shareholders place more weight on the annual earnings, because they are audited and, therefore, more reliable. Our focus on an incentive setting is supported by the empirical findings that earnings management measures contains multiple components, both accrual and real earnings management (Cohen & Zarowin, 2010; Cohen, Dey, & Lys, 2008; Leuz & Wysocki, 2016). As such, we investigate the impact the discount rate has on managers' willingness to meet or beat the zero earnings target and the last year's earnings target by engaging in accruals or real earnings management. We estimate the following regression:

$$\begin{aligned} ABACC_{it}\, or ACFO_{it} = {} & \alpha_0 + \beta_1 DISCRATE_t{*}BENCH_{it} + \beta_2 DISCRATE_t + \beta_3 BENCH_{it} + \beta_4 AGE_{it} + \beta_5 BM_{it} + \beta_6 SIZE_{it} + \beta_7 GROWTH_{it} \\ & + \beta_8 INDGROWTH_{it} + \beta_9 OPCYCLE_{it} + \beta_{10} VOLSALES_{it} + \beta_{11} PBANK_{it} + \beta_{12} BIGN_{it} + \beta_{13} GDPGROWTH_t \\ & + \beta_{14} INF_t + \beta_{15} MINDEX_t + \varepsilon_{it}. \end{aligned} \tag{5}$$

In this regression, our variable of interest is the interaction term *DISCRATE * BENCH*. We use two versions of the *BENCH* variable: *BENCH_ZERO* or *BENCH_BEAT*. These are variables identify firms with incentives to manage earnings. *BENCH_ZERO* identifies firms that meet the zero earnings target, i.e. the variable has the value 1 if *ROA* is in the open interval 0 to 0.01, 0 otherwise. The second incentive is associated with firms' willingness to meet or beat last year's earnings. *BENCH_BEAT* is also a dummy variable, which has the value 1 if the increase in earnings scaled by total assets is in the open interval 0 to 0.01. We expect a positive and significant value for β_1 in Eq. (5), which would suggest that managers engage in more earnings management to beat various earnings targets during times with higher discount rates.

5. Model estimation

5.1. Descriptive statistics

Table 2 presents the descriptive statistics of the sample. Over the sample period 1988–2015, the mean (median) value of our discount rate proxy was 5.35 (5.26) per cent. The mean (median) of *ABACC* is −0.0034 (−0.0017). Further, the mean and median of *ACFO* is −0.0109 and −0.0106, respectively.

The mean (median) age of the firm in the sample was 20.83 (17) years and mean (median) size in asset was $2,574.00 ($262.72) million (2009 dollars). In the sample, a Big 4 auditor audited 82.49 per cent of the firms. The mean of *BENCH_ZERO* is 0.0408 and the mean of *BENCH_BEAT* is 0.0981, suggesting that 4.08% of the firm-year observations are classified as slightly beating the zero earnings target and 9.81% of the firm-year observations are classified as slightly beating last year's earnings.

5.2. Results

Table 3 reports the OLS regression results for Eq. (4), where we test whether the discount rates are associated with earnings quality. In the first result column |*ABACC*|is the dependent variable. The coefficient of *DISCRATE* is negative (coef.: −0.0538) and significant at the 1% level, suggesting that earnings quality is higher when discount rates are higher. The coefficients for our control variables are in line with prior literature. We find that older, larger and more stable firms have higher earnings quality. In the second result column, we re-estimate Eq. (4) with |*ACFO*| as the dependent variable. The estimated coefficient on *DISCRATE* is negative

[6] We use the gross national product (GNP) deflator to transform assets and sales into 2009 dollars.

[7] The Zmijewski score measurement of the probability of bankruptcy is calculated as: $b = \Phi[-4.803–3.599$ (return on assets) $+5.406$ (leverage) $– 0.100$ (current ratio)] (Zmijewski 1984, 69), where Φ is the cumulative distribution function of the standard/unit normal distribution.

Table 2
Descriptive Statistics.

	Mean	Std. Dev.	Median	25th percentile	75th percentile
DISCRATE	0.0534	0.0192	0.0526	0.0401	0.0657
ABACC	−0.0034	0.0943	−0.0017	−0.0449	0.0374
ACFO	−0.0109	0.1410	−0.0106	−0.0726	0.0469
AGE	20.83	13.1	17	10	28
BM	0.6292	0.7096	0.5250	0.2992	0.8327
SIZE	2574.00	7763.20	262.72	53.98	1382.75
GROWTH	1.1045	0.358	1.0470	0.9612	1.1544
INDGROWTH	1.0765	0.0938	1.0715	1.0299	1.1210
OPCYCLE	9.4650	2.188	9.3493	7.8295	10.98
VOLSALES	0.1861	0.1716	0.1356	0.0751	0.2379
PBANK	0.1061	0.2206	0.0104	0.0003	0.0879
BIGN	0.8249	0.3801	1	1	1
BENCH_ZERO	0.0408	0.1977	0	0	0
BENCH_BEAT	0.0981	0.2975	0	0	0

This table presents descriptive statistics (mean, standard deviation, median and percentiles) for the discount rate and firm-specific variables used in our main regression. The sample contains 61,439 firm-year observations and covers a time period from 1988 to 2015. Variable definitions are presented in Appendix A.

Table 3
Earnings quality and the discount rate.

	|ABACC|	|ACFO|
DISCRATE	−0.0538***	−0.3277***
	(−2.78)	(−11.22)
AGE	−0.0002***	−0.0002***
	(−12.29)	(−7.72)
BM	−0.0039***	−0.0147***
	(−8.87)	(−23.51)
SIZE	−0.0168***	−0.0246***
	(−46.67)	(−45.11)
GROWTH	0.0404***	0.0640***
	(29.17)	(31.35)
INDGROWTH	0.0165***	0.0193***
	(5.90)	(4.91)
OPCYCLE	0.0089***	0.0109***
	(26.81)	(22.00)
VOLSALES	0.0410***	0.0386***
	(19.62)	(12.56)
PBANK	0.0478***	0.0463***
	(25.26)	(15.48)
BIGN	0.0008	−0.0056***
	(0.93)	(−4.18)
GDPGROWTH	−0.0013***	−0.0003
	(−5.14)	(−0.87)
INF	−0.0073	0.0961**
	(−0.27)	(2.47)
MINDEX	0.0002***	0.0004***
	(5.39)	(6.21)
INTERCEPT	−0.0034	0.0332***
	(−0.70)	(4.70)
R-squared	0.186	0.189
No. of obs.	61,439	61,439

This table presents estimates from an OLS regression of earnings quality measures (|ABACC| and |ACFO|) on our variable of interest the DISCRATE, controlling for firm characteristics and macroeconomic characteristics. DISCRATE is the yield on the Federal Reserve 10-year treasury bond. The sample period covers 1988 to 2015. The control variable definitions are presented in Appendix A. The t-statistics are reported in parentheses. *10% significance; **5% significance; ***1% significance.

(coef.: −0.3277) and statistically significant at the 1% level. These findings imply that, during periods with higher discount rates the firms report with a higher earnings quality. Notably, higher earnings quality is often associated with *less* earnings management. However, the average earnings quality is affected by other factors, as the composition of publicly listed firms. Srivastava (2014) argue that the decline in earnings quality is a result of the increase in firms from knowledge-intensive industries.

To further disentangle the relationship between earnings quality and discount rates, we examine the income-increasing and

Table 4
Income-increasing and income-decreasing earnings management and the discount rate.

	Panel A: Income-increasing earnings management		Panel B: Income-decreasing earnings management	
	ABACC	ACFO	ABACC	ACFO
DISCRATE	0.0379	−0.4135***	0.1018***	−0.0023
	(1.13)	(−7.91)	(3.03)	(−0.05)
AGE	0.0002***	−0.0001	0.0005***	0.0002***
	(4.97)	(−0.88)	(12.76)	(3.53)
BM	0.0055***	0.0240***	0.0100***	0.0409***
	(8.44)	(24.89)	(15.31)	(43.38)
SIZE	−0.0135***	−0.0167***	0.0074***	0.0149***
	(−25.17)	(−20.11)	(13.80)	(20.80)
GROWTH	0.0392***	0.0469***	−0.0094***	−0.0311***
	(32.88)	(25.83)	(−7.77)	(−19.10)
INDGROWTH	0.0002	0.0207***	−0.0203***	−0.0060
	(0.05)	(2.91)	(−4.43)	(−0.98)
OPCYCLE	0.0076***	0.0067***	−0.0035***	−0.0071***
	(14.68)	(8.36)	(−6.70)	(−10.29)
VOLSALES	0.0217***	0.0982***	−0.0280***	0.0407***
	(8.35)	(25.05)	(−10.82)	(11.37)
PBANK	0.0375***	0.2238***	−0.0200***	0.1860***
	(18.00)	(72.55)	(−9.70)	(58.35)
BIGN	0.0020	0.0168***	0.0009	0.0211***
	(1.61)	(8.69)	(0.68)	(12.77)
GDPGROWTH	−0.0008*	0.0039***	0.0008**	0.0035***
	(−1.82)	(5.91)	(1.97)	(6.24)
INF	0.0089	−0.0675	0.0200	−0.1465**
	(0.20)	(−0.96)	(0.44)	(−2.43)
MINDEX	0.0000	−0.0006***	−0.0002***	−0.0009***
	(0.45)	(−6.26)	(−3.55)	(−10.64)
INTERCEPT	−0.0673***	−0.0744***	0.0279***	0.0154
	(−9.02)	(−6.42)	(3.76)	(1.55)
lnsigma	0.0932***	0.1413***	0.0940***	0.1260***
	(223.81)	(215.13)	(229.89)	(241.94)
Uncen. obs.	22,937	27,367	31,502	34,072
No. of obs.	61,439	61,439	61,439	61,439

This table presents estimates from Tobit regressions of earnings management (ABACC and ACFO) on our variable of interest DISCRATE, controlling for firm characteristics and macroeconomic characteristics. DISCRATE is the yield on the Federal Reserve 10-year treasury bond. Panel A contains observations with positive values for our earnings management measures. Panel B contains observations with negative values. The sample period covers 1988 to 2015. The control variable definitions are presented in Appendix A. The t-statistics are reported in parentheses. *10% significance; **5% significance; ***1% significance.

income-decreasing abnormalities separately. Table 4 presents results of Tobit regressions of Eq. (4) with income-increasing abnormalities as dependent variable in Panel A and income-decreasing abnormalities as dependent variable in Panel B. The association between *DISCRATE* and *ABACC* is positive in both panels, suggesting more income-increasing earnings management during times with higher discount rates. However, the coefficient is statistically significant only in Panel B, which suggests that managers avoid using accruals for income-decreasing earnings management when discount rates are higher. Interestingly, we find the exact opposite result with *ACFO* as our dependent variable. In result column (2) in Panel A, the coefficient for *DISCRATE* is negative and significant (coef.: −0.4135, t-stat: −7.91). This result suggests that during periods with high discount rate managers engage in less income-increasing real earnings management.

To explicitly examine the relationship between the discount rate and the managers' engagement in income-increasing *earnings management*, we study how the discount rate affects managers' use of *ABACC* and *ACFO* as a tool for beating earnings targets. Table 5 consists of two panels. Panel A focuses on the zero earnings target (*BENCH_ZERO*) and Panel B on the last year's earnings target (*BENCH_BEAT*). In both panels, the variable of interest is the interaction between *DISCRATE* and the *BENCH* dummy. In Panel A, the coefficient for the interaction is 0.1356 (t-stat: 1.88) in column (1) and 0.2345 (t-stat: 2.18) in column (2). The results in Panel B are in line with our finding in Panel A. In Panel B, the interaction coefficients are 0.0868 (t-stat: 2.16) and 0.3020 (t-stat: 5.07). Overall, we find a statistically significant positive association between earnings management to meet or beat earnings targets and discount rates. In terms of economical magnitude, in the case of the zero earnings target, a one percentage increase in the discount rate is associated with on average a 0.14% of total asset increase in accrual-based earnings management and a 0.23% of total asset increase in real earnings management.

6. Robustness and sensitivity analysis

We test the robustness of our results in Table 5 by considering two other proxies associated with the discount rate. Our first

Table 5
Earnings management conditional on meeting and beating earnings targets.

Panel A: Zero earnings			Panel B: Last year's earnings		
	ABACC	ACFO		ABACC	ACFO
BENCH_ZERO * DISCRATE	0.1356*	0.2345**	BENCH_BEAT * DISCRATE	0.0868**	0.3020***
	(1.88)	(2.18)		(2.16)	(5.07)
DISCRATE	0.0204	−0.2069***	DISCRATE	0.0161	−0.2335***
	(0.71)	(−5.01)		(0.54)	(−5.45)
BENCH_ZERO	0.0055	−0.0052	BENCH_BEAT	0.0007	−0.0108***
	(1.38)	(−0.85)		(0.30)	(−3.25)
AGE	0.0002***	0.0001	AGE	0.0002***	0.0000
	(8.24)	(1.15)		(7.91)	(0.99)
BM	0.0045***	0.0250***	BM	0.0048***	0.0253***
	(6.84)	(28.74)		(7.46)	(29.17)
SIZE	−0.0035***	−0.0004	SIZE	−0.0036***	−0.0005
	(−6.34)	(−0.46)		(−6.57)	(−0.70)
GROWTH	0.0170***	0.0116***	GROWTH	0.0169***	0.0117***
	(7.60)	(3.70)		(7.58)	(3.72)
INDGROWTH	−0.0123***	0.0005	INDGROWTH	−0.0121***	0.0011
	(−3.00)	(0.09)		(−2.95)	(0.19)
OPCYCLE	0.0025***	−0.0001	OPCYCLE	0.0025***	0.0000
	(5.04)	(−0.13)		(5.15)	(0.00)
VOLSALES	−0.0030	0.0594***	VOLSALES	−0.0024	0.0601***
	(−0.96)	(13.32)		(−0.77)	(13.44)
PBANK	0.00061	0.2006***	PBANK	0.0012	0.2011***
	(0.20)	(49.75)		(0.41)	(49.89)
BIGN	0.0018	0.0210***	BIGN	0.0019	0.0212***
	(1.33)	(10.86)		(1.42)	(10.98)
GDPGROWTH	0.0001	0.0028***	GDPGROWTH	0.0001	0.0028***
	(0.29)	(5.39)		(0.17)	(5.34)
INF	0.0233	−0.0658	INF	0.0218	−0.0661
	(0.59)	(−1.21)		(0.55)	(−1.21)
MINDEX	−0.0001	−0.0006***	MINDEX	−0.0001	−0.0006***
	(−1.01)	(−7.62)		(−0.97)	(−7.62)
INTERCEPT	−0.0184**	−0.0273***	INTERCEPT	−0.0185**	−0.0268***
	(−2.55)	(−2.72)		(−2.56)	(−2.67)
R-squared	0.006	0.096	R-squared	0.006	0.096
No. of obs.	61,439	61,439	No. of obs.	61,439	61,439

This table presents estimates from an OLS regressions of earnings management (ABACC and ACFO) on our variable of interest the interaction between DISCRATE and BENCH (BENCH_ZERO and BENCH_BEAT), controlling for firm characteristics and macroeconomic characteristics. BENCH_ZERO and BENCH_BEAT are dummy variables for firms that report small profits and small earnings increases (1 percent of total assets). DISCRATE is the yield on the Federal Reserve 10-year treasury bond. The sample period covers 1988 to 2015. The control variable definitions are presented in Appendix A. The t-statistics are reported in parentheses. *10% significance; **5% significance; ***1% significance.

alternative proxy is the implied discount rate (*I_DISCRATE*) (Damodaran 2017). The implied discount rate is the sum of the implied equity risk premium and *DISCRATE*.[8] The implied discount rate is forward looking and calculated using the S&P 500 index and expectations for future cash flows for the index. The second alternative is *CAY*, an estimate for the log consumption-wealth, according to Lettau and Ludvigson (2001) investors will decrease consumption when the excess returns are expected to be lower going forward.[9] For both alternative discount rate proxies, we repeat the tests done in Table 5.

Table 6 presents the results of estimating Eq. (5) when the implied discount rate is used as proxy for the discount rate. Our variable of interest is the interaction term (*BENCH * I_DISCRATE*). In Panel A, we find positive and significant interaction coefficients. These results are consistent with our findings in Table 5, that during periods with higher discount rates firm managers engage in more earnings management than during periods with lower discount rates. Importantly, managers increase their engagement in both accrual-based earnings management and real earnings management.

In Table 7, we use *CAY* as our proxy for the discount rate. Table 7 follows the same structure as Tables 5 and 6. The results in Panel A show positive coefficients for the interaction terms, suggesting that managers in our sample use more *ABACC* and *ACFO* to beat the zero earnings target when the discount rate is higher. However, the positive coefficients are statistically insignificant. In the column (2) of Panel B, where the dependent variable is *ACFO*, we find a positive and highly significant interaction coefficient (coef.: 0.2575, t-stat: 3.77). In summary, Tables 6 and 7 provide support for our findings that managers use more earnings management through accruals and real operating activities during times with high discount rates.

In other (untabulated) sensitivity analysis, we also use alternative accruals and real earnings management proxies. For accruals

[8] The implied equity risk premium is downloaded from Damodaran's homepage.
[9] The *CAY* data is downloaded from: http://faculty.haas.berkeley.edu/lettau/data_cay.html

Table 6
Earnings management and the implied discount rate.

Panel A: Zero earnings			Panel B: Last year's earnings		
	ABACC	ACFO		ABACC	ACFO
BENCH_ZERO * I_DISCRATE	0.1090*	0.1915**	BENCH_BEAT * I_DISCRATE	0.0935***	0.2675***
	(1.82)	(2.18)		(2.79)	(5.47)
I_DISCRATE	0.0217	−0.1295***	I_DISCRATE	0.0152	−0.1526***
	(0.98)	(−4.12)		(0.66)	(−4.67)
BENCH_ZERO	0.0043	−0.0077	BENCH_BEAT	−0.0020	−0.0157***
	(0.89)	(−1.06)		(−0.76)	(−3.94)
AGE	0.0002***	0.0001	AGE	0.0002***	0.0000
	(8.25)	(1.23)		(7.93)	(1.09)
BM	0.0044***	0.0250***	BM	0.0048***	0.0253***
	(6.82)	(28.74)		(7.44)	(29.17)
SIZE	−0.0035***	−0.0003	SIZE	−0.0036***	−0.0005
	(−6.34)	(−0.44)		(−6.57)	(−0.69)
GROWTH	0.0170***	0.0116***	GROWTH	0.0169***	0.0116***
	(7.61)	(3.69)		(7.58)	(3.70)
INDGROWTH	−0.0123***	−0.0005	INDGROWTH	−0.0121***	0.0001
	(−3.02)	(−0.09)		(−2.96)	(0.01)
OPCYCLE	0.0025***	−0.0000	OPCYCLE	0.0026***	0.0001
	(5.05)	(−0.05)		(5.17)	(0.07)
VOLSALES	−0.0300	0.0594***	VOLSALES	−0.0024	0.0601***
	(−0.96)	(13.32)		(−0.76)	(13.43)
PBANK	0.0006	0.2007***	PBANK	0.0012	0.2012***
	(0.20)	(49.75)		(0.41)	(49.89)
BIGN	0.0017	0.0207***	BIGN	0.0019	0.0209***
	(1.31)	(10.71)		(1.41)	(10.83)
GDPGROWTH	0.0001	0.0029***	GDPGROWTH	0.0001	0.0029***
	(0.24)	(5.51)		(0.12)	(5.47)
INF	0.0163	−0.1024*	INF	0.0151	−0.1036*
	(0.41)	(−1.90)		(0.38)	(−1.92)
MINDEX	−0.0001	−0.0007***	MINDEX	−0.0001	−0.0007***
	(−0.87)	(−9.21)		(−0.85)	(−9.25)
INTERCEPT	−0.0197***	−0.0185*	INTERCEPT	−0.0195***	−0.0173*
	(−2.77)	(−1.86)		(−2.73)	(−1.73)
R-squared	0.006	0.096	R-squared	0.006	0.096
No. of obs.	61,439	61,439	No. of obs.	61,439	61,439

This table presents estimates from an OLS regression of earnings management (ABACC and ACFO) on our variable of interest the interaction between I_DISCRATE and BENCH (BENCH_ZERO and BENCH_BEAT), controlling for firm characteristics and macroeconomic characteristics. BENCH_ZERO and BENCH_BEAT are dummy variables for firms that report small profits and small earnings increases (1 percent of total assets). I_DISCRATE is the sum of the implied equity risk premium and DISCRATE. The sample period covers 1988 to 2015. The control variable definitions are presented in Appendix A. The t-statistics are reported in parentheses. *10% significance; **5% significance; ***1% significance.

earnings management we use the estimation techniques by Kothari et al. (2005), Dechow, Sloan, and Sweeney (1995) and Ball and Shivakumar (2006) and for real earnings management we, in line with Roychowdhury (2006), estimate abnormal production costs and abnormal discretionary expenses. Our main result is quantitatively unaffected by the choice of accruals earnings management proxy and by selecting abnormal production costs as proxy for real earnings management. However, we are not able to obtain similar results with abnormal discretionary expenses.

7. Discussion and limitations

Our empirical evidence suggests that during periods with higher discount rates firms, on average, have significantly higher earnings quality in terms of lower earnings management. We find a positive association between discount rates and accruals and real earnings management, and between discount rates and target beating using income-increasing earnings management. Our results are robust for different discount rate proxies. Further, this association is evident for both earnings management through accruals and real operational activities. In the case of the zero earnings target, a one percentage-point increase in the discount rate is associated with a 0.14 percentage-point increase in abnormal accruals to total assets. Similarly, a one percentage-point increase in the discount rate is associated with real earnings management to the value of 0.23 percentage-point increase in total assets.

There might be several reasons for the modest size of the effect. The most obvious reason, as our simulation highlights, is probably that honesty usually pays. Second, although unknown, actual and perceived apprehension rates through civil or criminal penalties are most likely to be high enough to have a significant deterrent effect and decrease the present value of managing earnings. Third, discount rates are not high enough to encourage substantial earnings management. Our discount proxy is below ten per cent for most of the sample period. Fourth, senior managers of public corporations did not attain that position by having a short-term view. Finally,

Table 7
Earnings management and CAY.

Panel A: Zero earnings			Panel B: Last year's earnings		
	ABACC	ACFO		ABACC	ACFO
BENCH_ZERO * CAY	0.0761	0.1385	BENCH_BEAT * CAY	0.0600	0.2575***
	(0.88)	(1.08)		(1.35)	(3.77)
CAY	−0.0600**	−0.3295***	CAY	−0.0641**	−0.3535***
	(−2.51)	(−9.45)		(−2.52)	(−9.54)
BENCH_ZERO	0.0128***	0.0072***	BENCH_BEAT	0.0052***	0.0044***
	(8.57)	(3.26)		(6.30)	(3.51)
AGE	0.0002***	0.0000	AGE	0.0002***	0.0000
	(7.97)	(1.00)		(7.62)	(0.80)
BM	0.0045***	0.0252***	BM	0.0048***	0.0255***
	(6.73)	(28.46)		(7.35)	(28.88)
SIZE	−0.0036***	−0.0003	SIZE	−0.0037***	−0.0005
	(−6.50)	(−0.41)		(−6.70)	(−0.63)
GROWTH	0.0169***	0.0111***	GROWTH	0.0169***	0.0112***
	(7.49)	(3.51)		(7.47)	(3.52)
INDGROWTH	−0.0108***	0.0002	INDGROWTH	−0.0107***	0.0003
	(−2.61)	(0.03)		(−2.59)	(0.06)
OPCYCLE	0.0026***	−0.0001	OPCYCLE	0.0027***	−0.0000
	(5.24)	(−0.15)		(5.35)	(−0.03)
VOLSALES	−0.0021	0.0606***	VOLSALES	−0.0015	0.0613***
	(−0.65)	(13.41)		(−0.46)	(13.52)
PBANK	−0.0008	0.2007***	PBANK	−0.0002	0.2013***
	(−0.27)	(48.85)		(−0.07)	(48.98)
BIGN	0.0029**	0.0227***	BIGN	0.0030**	0.0229***
	(2.13)	(11.49)		(2.21)	(11.59)
GDPGROWTH	0.0002	0.0029***	GDPGROWTH	0.0001	0.0029***
	(0.39)	(5.53)		(0.25)	(5.44)
INF	0.0793**	−0.1089**	INF	0.0767**	−0.1129**
	(2.44)	(−2.45)		(2.36)	(−2.54)
MINDEX	−0.0000	−0.0007***	MINDEX	−0.0000	−0.0007***
	(−0.61)	(−8.52)		(−0.55)	(−8.50)
INTERCEPT	−0.0240***	−0.0331***	INTERCEPT	−0.0242***	−0.0334***
	(−3.32)	(−3.27)		(−3.35)	(−3.31)
R-squared	0.007	0.095	R-squared	0.006	0.096
No. of obs.	59,859	59,859	No. of obs.	59,859	59,859

This table presents estimates from an OLS regression of earnings management (ABACC and ACFO) on our variable of interest the interaction, controlling for firm characteristics and macroeconomic characteristics. BENCH_ZERO and BENCH_BEAT are dummy variables for firms that report small profits and small earnings increases (1 percent of total assets). CAY is a proxy for consumption-wealth ratio developed by Lettau and Ludvigson (2001). The sample period covers 1988 to 2015. The control variable definitions are presented in Appendix A. The t-statistics are reported in parentheses. *10% significance; **5% significance; ***1% significance.

senior management's base compensation that is not tied to earnings is probably high enough to reduce the incentive to engage in upward earnings manipulation.

There are some significant caveats to our findings that must be acknowledged. We have not controlled for changes in apprehension rates, actual or perceived, because data on who dishonestly manages earnings upwards and is unapprehended is unknown. As such, we assume it to be uncorrelated with discount rates, and we do not provide any empirical evidence on how changes in apprehension rates might affect earnings management. Further, managers' personal discount rates are most likely not the same for all individuals and are likely to change differently for everyone for various reasons. Our proxy does not capture this heterogeneity of individual managers' discount rates. Our findings may suggest, however, that in certain incentive settings managers, who are generally honest, might be tempted to manage earnings as discount rates increase. Moreover, our empirical and theoretical models are straightforward and, as such, are an imperfect simplification of a more complicated underlying reality.[10] That said, models can provide important insights by removing the complexity in the real world. Our application of Buchholz's (1988) simple model highlights how the present value aspect is likely to affect whether some managers inflate earnings.

It is also important to note that we do not suggest that all managers weight up the cost and benefits of earnings management, but merely that they act as if they do. Further, we do not distinguish between managers who "manage" earnings within or outside GAAP. We also did not consider the general changes in managers' compensation over the sample period, which would quite obviously be related to the benefits of acting either honestly or dishonestly. Regarding the latter point, the benefits of earnings management for the

[10] That said, it is hard to criticize Buchholz's (1988) theory on this ground. Theory, by its very nature, is an abstraction from the real world. It is a device for singling out only the most essential factors and relationships so that we can study the crux of the problem at hand. Thus, the statement that theory lacks realism is, in many respects, merely a truism.

manager, are likely to have changed over the sample period (due to stock options, warrants, etc.). But at the same time, that means that the benefits of acting honestly have changed. In that regard, we also did not take into account how different compensation plans might affect managers' decisions on whether to dishonestly use income-increasing earnings management.

8. Conclusion

We examine the association between discount rates and income-increasing earnings management. We expect that higher discount rates reduce the present value of managing earnings less than the present value of not managing earnings. Consequently, this increases the likelihood of earnings management either through accruals or real operating activities. In certain incentive settings, we find positive and significant associations between the proxy for managers' discount rates and income-increasing earnings management. The increase in earnings management is prevalent both for accrual-based earnings management and real earnings management. Specifically, our estimations suggest that a one percentage-point increase in the discount rate is associated with an economically moderate increase of about 0.14 percentage-points of total assets through accrual-based earnings management and 0.23 percentage-points of total assets through real earnings management.

We acknowledge that this analysis is somewhat tentative. Our analysis offers conjectures that would need to be extended in future research. The analysis considers simplified theoretical and empirical models and simplified proxies of managers' discount rates. This paper does not consider managers' apprehension rates of extensive earnings management. However, we demonstrate that one cannot rule out the possibility that the present value aspect matters in managers' decisions to use earnings management. In this regard, we find support for our notion that when managers have reason to discount the future more severely, the use of income-increasing earnings management increases.

Appendix A. Variable definitions

DISCRATE Yield on Federal Reserve 10-year treasury bond
ABACC Accrual-based earnings management measure estimated using the model by Collins et al. (2017)
ACFO Real earnings management measure estimated using the model by Roychowdhury (2006)
BENCH_ZERO Dummy variable indicating firm-years with small earnings (ROA in the open interval 0 and 1 percent)
BENCH_BEAT Dummy variable indicating firm-years with small increases in earnings (Increases in the open interval 0 to 1 percent of total assets)
AGE The number of years the client firm has been listed
ASSETS Total assets in USD million (2009 dollars)
SIZE Natural log of ASSETS
GROWTH Total assets_t/Total assets_{t-1}
INDGROWTH By two digit GIC-code sum of total assets_t/sum of total assets_{t-1}
OPCYCLE Natural log of sum of days receivables and days inventory
VOLSALES Rolling five-year standard deviation of sales
PBANK Probability of bankruptcy using Zmijewski (1984) model
BIGN Indicator variable, 1 if the audit firm is a Big 4 auditor, 0 otherwise
GDPGROWTH Growth in GDP. Downloaded from the FRED database
INF Inflation. Downloaded from the FRED database
MINDEX Michigan Consumer Sentiment Index
I_DISCRATE The sum of the implied equity risk premium by Damodaran (2017) and DISCRATE
CAY An estimate for the log consumption-wealth developed by Lettau and Ludvigson (2001)

References

Ali, A., & Zhang, W. (2015). Ceo tenure and earnings management. *Journal of Accounting and Economics, 59*(1), 60–79.
Antia, M., Pantzalis, C., & Park, J. C. (2010). Ceo decision horizon and firm performance: An empirical investigation. *Journal of Corporate Finance, 16*(3), 288–301.
Baber, W. R., Sok-Hyon, K., & Ying, L. (2011). Modeling discretionary accrual reversal and the balance sheet as an earnings management constraint. *The Accounting Review, 86*(4), 1189–1212.
Baiman, S., & Lewis, B. L. (1989). An experiment testing the behavioral equivalence of strategically equivalent employment contracts. *Journal of Accounting Research, 27*(1), 1–20.
Ball, R., & Shivakumar, L. (2006). The role of accruals in asymmetrically timely gain and loss recognition. *Journal of Accounting Research, 44*(2), 207–242.
Barton, J., & Simko, P. J. (2002). The balance sheet as an earnings management constraint. *Accounting Review, 77*(4), 1.
Becker, C. L., Defond, M. L., Jiambalvo, J., & Subramanyam, K. R. (1998). The effect of audit quality on earnings management*. *Contemporary Accounting Research, 15*(1), 1–24.
Bergstresser, D., & Philippon, T. (2006). Ceo incentives and earnings management. *Journal of Financial Economics, 80*(3), 511–529.
Brickley, J. A., Linck, J. S., & Coles, J. L. (1999). What happens to ceos after they retire? New evidence on career concerns, horizon problems, and ceo incentives. *Journal of Financial Economics, 52*(3), 341–377.
Buchholz, T. G. (1988). Revolution, reputation effects, and time horizons. *Cato Journal, 8*(1), 185–197.
Burgstahler, D., & Dichev, I. (1997). Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics, 24*(1), 99–126.
Carey, P., & Simnett, R. (2006). Audit partner tenure and audit quality. *The Accounting Review, 81*(3), 653–676.
Chen, T., Harford, J., & Lin, C. (2015). Do analysts matter for governance? Evidence from natural experiments. *Journal of Financial Economics, 115*(2), 383–410.
Cohen, D. A., & Zarowin, P. (2010). Accrual-based and real earnings management activities around seasoned equity offerings. *Journal of Accounting and Economics, 50*(1), 2–19.

Cohen, D. A., Dey, T. Z., & Lys, A. (2008). Real and accrual-based earnings management in the pre- and post-sarbanes-oxley periods. *The Accounting Review, 83*(3), 757–787.
Collins, D. W., Pungaliya, R. S., & Vijh, A. M. (2017). The effects of firm growth and model specification choices on tests of earnings management in quarterly settings. *The Accounting Review, 92*(2), 69–100.
Damodaran, A. (2017). *Equity risk premiums (erp): Determinants, estimation and implications – the 2017 edition. working paper.* March 27, 2017. Available from https://ssrn.com/abstract=2947861.
Davidson, W., III, Xie, B., Xu, W., & Ning, Y. (2007). The influence of executive age, career horizon and incentives on pre-turnover earnings management. *Journal of Management & Governance, 11*(1), 45–60.
DeFond, M. L., & Park, C. W. (2001). The reversal of abnormal accruals and the market valuation of earnings surprises. *The Accounting Review, 76*(3), 375–404.
Dechow, P. M., & Sloan, R. G. (1991). Executive incentives and the horizon problem: An empirical investigation. *Journal of Accounting and Economics, 14*(1), 51–89.
Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of Accounting and Economics, 50*(2–3), 344–401.
Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. *The Accounting Review, 70*(2), 193–225.
Dechow, P. M., Kothari, S. P., & Watts, R. L. (1998). The relation between earnings and cash flows. *Journal of Accounting and Economics, 25*(2), 133–168.
Desai, H., Hogan, C. E., & Wilkins, M. S. (2006). The reputational penalty for aggressive accounting: Earnings restatements and management turnover. *The Accounting Review, 81*(1), 83–112.
Eames, M. (1998). *Management of earnings and analyst forecasts. Working paper.* University of Washington.
Evans, J. H., Hannan, R. L., Krishnan, R., & Moser, D. V. (2001). Honesty in managerial reporting. *Accounting Review, 76*(4), 537.
Franz, D., HassabElnaby, H., & Lobo, G. (2014). Impact of proximity to debt covenant violation on earnings management. *Review of Accounting Studies, 19*(1), 473–505.
Gaver, J. J., Gaver, K. M., & Austin, J. R. (1995). Additional evidence on bonus plans and income management. *Journal of Accounting and Economics, 19*(1), 3–28.
Gopalan, R., Milbourn, T., Song, F., & Thakor, A. V. (2014). Duration of executive compensation. *The Journal of Finance, 69*(6), 2777–2817.
Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics, 40*(1–3), 3–73.
Guo, H., & Jiang, X. (2011). Accruals and the conditional equity premium. *Journal of Accounting Research, 49*(1), 187–221.
Healy, P. M. (1985). The effect of bonus schemes on accounting decisions. *Journal of Accounting and Economics, 7*(1–3), 85–107.
Healy, P. M., & Wahlen, J. M. (1999). A review of the earnings management literature and its implications for standard setting. *Accounting Horizons, 13*(4), 365–383.
Holthausen, R. W., Larcker, D. F., & Sloan, R. G. (1995). Annual bonus schemes and the manipulation of earnings. *Journal of Accounting and Economics, 19*(1), 29–74.
Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360.
Kang, Q., Liu, Q., & Qi, R. (2010). Predicting stock market returns with aggregate discretionary accruals. *Journal of Accounting Research, 48*(4), 815–858.
Kaplan, S. E., McElroy, J. C., Ravenscroft, S. P., & Shrader, C. B. (2007). Moral judgment and causal attributions: Consequences of engaging in earnings management. *Journal of Business Ethics, 74*(2), 149–164.
Kim, J., Kim, Y., & Zhou, J. (2017). Languages and earnings management. *Journal of Acounting and Economics, 63*(2–3), 288–306.
Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. *Journal of Accounting and Economics, 39*(1), 163.
Lettau, M., & Ludvigson, S. (2001). Consumption, aggregate wealth, and expected stock returns. *The Journal of Finance, 56*(3), 815–849.
Leuz, C., & Wysocki, P. D. (2016). The economics of disclosure and financial reporting regulation: Evidence and suggestions for future research. *Journal of Accounting Research, 54*(2), 525–622.
Luft, J. L. (1997). Fairness, ethics and the effect of management accounting on transaction costs. *Journal of Management Accounting Research, 9*, 199–216.
Myers, J. N., Myers, L. A., & Omer, T. C. (2003). Exploring the term of the auditor-client relationship and the quality of earnings: A case for mandatory auditor rotation? *Accounting Review, 78*(3), 779–799.
Rangan, S. (1998). Earnings management and the performance of seasoned equity offerings. *Journal of Financial Economics, 50*(1), 101–122.
Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics, 42*(3), 335–370.
Simpson, A. (2013). Does investor sentiment affect earnings management? *Journal of Business Finance & Accounting, 40*(7–8), 869–900.
Srivastava, A. (2014). Why have measures of earnings quality changed over time? *Journal of Accounting and Economics, 57*(2), 196–217.
Strobl, G. (2013). Earnings manipulation and the cost of capital. *Journal of Accounting Research, 51*(2), 449–473.
Teoh, S. H., Welch, I., & Wong, T. J. (1998). Earnings management and the long-run market performance of initial public offerings. *The Journal of Finance, 53*(6), 1935–1974.
Wang, T. Y., Winton, A., & Yu, X. (2010). Corporate fraud and business conditions: Evidence from ipos. *The Journal of Finance, 65*(6), 2255–2292.
Watts, R. L., & Zimmerman, J. L. (1986). *Positive accounting theory.* Prentice-Hall Inc. Available from http://ssrn.com/paper=928677.
Zmijewski, M. E. (1984). Methodological issues related to the estimation of financial distress prediction models. *Journal of Accounting Research, 22*(Suppl), 59–82.