



## EARNINGS-BASED BONUS PLANS AND EARNINGS MANAGEMENT BY BUSINESS-UNIT MANAGERS

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### Abstract

This study tests the bonus-maximization hypothesis that managers make discretionary accrual decisions to maximize their short-term bonuses. By using the management and financial reporting database of a large conglomerate, we extend previous investigations in two ways. First, the analysis is conducted using business unit-level data, which reduces the aggregation problem that is likely to arise using firm-level data. Second, managers in this setting are paid bonuses based solely on business unit earnings. The potentially confounding effects of long-term performance and stock-based incentive compensation are thus absent. These innovations yield robust evidence consistent with Healy (1985).

### Keywords:

Earnings management;  
Discretionary accruals;  
Bonus plans

### INTRODUCTION

A number of studies examine managers' motivation to manipulate earnings, including the influence of short-term bonus plans on managers' discretionary accrual decisions (Healy, 1985; Gaver et al., 1995 (GGA); Holthausen et al., 1995 (HLS)). The results of these studies are mixed due in part to the limitations of using aggregated financial data from a large cross section of firms that have varying forms of incentive compensation. Bernard and Skinner (1996) suggest that advancing research on earnings management requires moving away from the use of large-scale databases to more homogenous settings where researchers are more informed about managers' ability to manage specific accounts. The purpose of this study is to investigate earnings management and short-term bonuses in such a setting, where the power of tests is likely to be enhanced. The management and financial reporting database of a large conglomerate is used to examine earnings management by business-unit managers for 179 business-unit years for the time period 1994—1995. This approach allows us to extend previous research in several ways.

First, the level of analysis is the business unit, whereas prior studies use firm-level data that aggregate discretionary accruals made by lower-level managers. Second, we conduct tests of bonus-based earnings management in an environment where, relative to prior studies, the potential effects of competing incentives (such as stock ownership and stock-based compensation) to manage earnings are reduced (see Healy, 1985; HLS; GGA). Finally, a specific account where earnings management is likely to occur is identified through discussions with both senior and middle-level managers and an additional discretionary

accrual measure is developed and used. These extensions allow for more direct tests of Healy's (1985) theory.

Healy reports that managers use discretionary accruals to maximize short-term bonus compensation (hereafter referred to as the bonus-maximization hypothesis). Recent studies (HLS and GGA) re-examine the issue of short-term bonus plans and earnings management. HLS report evidence consistent with Healy that managers make income-decreasing discretionary accruals after they reach their maximum bonus level. However, contrary to Healy, they find no evidence that managers make income-decreasing discretionary accruals when earnings are below the minimum necessary to earn a bonus. GGA's results support income smoothing and are inconsistent with Healy's bonus-maximization hypothesis. Like HLS and GGA, we refer to the smoothing hypothesis as behaviour consistent with managers seeking to minimize the difference between budget and actual performance over time.

The mixed results cast doubt that managers' earnings-based bonus plans influence their accounting choices. Alternatively, the hypothesis is valid, but the settings of previous studies limit the power of tests of earnings management. The aforementioned studies examine discretionary accruals made by senior-level executives using firm-level data, which summarize the financial results of a firm's business units or divisions. However, the type of behaviour Healy describes is more likely to be detected at the business-unit level, where earnings management by individual managers is not obscured in aggregated financial information. To the extent that the incentives of individual managers differ within a given reporting period, income-increasing discretionary accruals in one business unit offset income-decreasing discretionary accruals in another business unit.

The power of tests of bonus-based incentives is further enhanced in our sample because the business-unit managers receive no compensation from long-term performance or stock option plans and own insignificant amounts of the firm's stock. While the studies by Healy (1985) and GGA control for the effects of long-term performance plans, no prior study controls for the effects of both stock ownership and stock-related compensation. Also, research on earnings management is often subject to criticism because current methods of estimating discretionary accruals are relatively crude (Dechow et al., 1995). We develop and test a discretionary accrual measure appropriate in our sample based on a deterministic model intended to remove the nondiscretionary component of each business unit's inventory reserve. This unique discretionary accrual proxy likely contains less measurement error than those in previous studies, further increasing the power of tests of the bonus-maximization hypothesis.

Using several proxies for discretionary accruals, including a measure related to inventory (described in Section 4.2), total accruals (Healy, 1985), and discretionary accruals generated from a modified version of the Jones (1991) model (Dechow et al., 1995), our results are consistent with Healy's bonus-maximization hypothesis. Business-unit managers in the bonus range with incentives to make income-increasing discretionary accruals, appear to manage earnings upward relative to business-unit managers who are not in the bonus range. The results have several implications. First, the results support Watts and Zimmerman's (1986) argument that managers' incentives influence their accounting choices. Second, as suggested by Beaver (1996) and Schipper (1990), researchers can increase the power of theory testing by matching theory with an appropriate context.

Third, to the extent that summary external financial reports reflect an aggregation of business unit financial data, the results suggest that internal contracts influence the period-to-period content of external financial reports as conjectured by Watts and Zimmerman (1990).

The remainder of this paper is organized into four sections. Section 2 describes previous research on earnings management with particular emphasis on empirical studies of the bonus-maximization hypothesis. Section 3 provides details on the subject firm and sample. Section 4 presents the research design, analysis, and results. Finally, Section 5 concludes the paper.

## **Earnings Management and Bonus Plans**

### ***Prior Research***

Healy (1985) hypothesizes that because short-term bonuses based on accounting earnings comprise a large part of their compensation, managers choose discretionary accruals to maximize their short-term bonuses. Healy notes that many firms have bonus plans in which funds are allocated to a bonus pool based on actual performance relative to target performance. No funds are allocated to the bonus pool when actual performance is below some minimum threshold (lower bound). As performance exceeds the minimum, funds are added linearly in relation to performance, up to a ceiling (upper bound) at which point the bonus pool is capped.

Healy models the earnings-management behaviour of a single manager assuming such a bonus formula with fixed parameters and a two-period world. Though Healy assumes that bonus parameters remain fixed, Leone et al. (1998) provide evidence that this is not the case with the firm used in this study. Leone et al. find that target changes exhibit a ratchet effect where the change in the performance target from one year to the next is a function of the current year's actual performance relative to the target. Specifically, favourable performance variances are followed by larger absolute changes in the following year's target compared to changes associated with unfavourable performance variances. The primary difference between the expected behaviour of managers facing fixed versus ratcheting targets is that managers who have incentive to manage earnings upward do so to a lesser extent when they face a ratcheting target of the type reported in the study. As shown in Leone et al., assuming a fixed target is likely to bias against our predicted findings.

In addition to the assumption of fixed targets, Healy assumes that each manager observes income before discretionary accruals and makes either income-increasing or decreasing discretionary accruals based on his/her incentives. The resulting implications are that: (1) when income before discretionary accruals is sufficiently below the lower bound or above the upper bound, managers will make income-decreasing discretionary accruals in anticipation of increasing the probability of earning a bonus in the future; and (2) when earnings before discretionary accruals fall between the upper and lower bounds or are sufficiently close to the lower bound, the manager will make income-increasing discretionary accruals. Consistent with his hypothesis, Healy reports evidence that discretionary accruals are more negative for managers with bonus-related incentives to manage earnings downward than for managers with incentives to manage earnings upward.

Healy's use of total accruals as a proxy for discretionary accruals is the subject of some criticism (see Kaplan, 1985; McNichols and Wilson, 1988; Kang and Sivaramakrishnan, 1995; HLS). As Healy acknowledges, using total accruals as a proxy for discretionary accruals introduces biases that support his bonus-maximization hypothesis. For example, the lower-bound portfolio (LOW) consists of firms with earnings below the lower bound. It may be that negative non-discretionary accruals are the cause of the lower earnings (Kaplan, 1985). Additionally, the empirical implications of Healy's theory are the same as those of income smoothing when comparing the discretionary accruals of firms with earnings above the upper bound (UPP) to the discretionary accruals of firms with earnings in the bonus range (MID). Therefore, it is difficult to differentiate between these competing hypotheses. Further, Healy's categorization of firm-years into the UPP portfolio based on operating cash flows instead of earnings may also induce his results. Dechow et al. (1995) report that firms with high cash flows also have large negative accruals (see also Dechow, 1994). Firms in their sample of 1000 randomly selected firm-years from the highest decline of cash flows exhibit significantly negative total accruals 50% of the time.

HLS and GGA attempt to improve Healy's experimental design and re-test his hypotheses. Table 1 provides a comparison of these studies (including a comparison with this study). Both studies use a refined proxy for discretionary accruals estimated using a modified Jones model developed by Dechow et al. (1995). This model, which is detailed in Section 4.2, attempts to exclude non-discretionary accruals that are attributable to increases in sales and the level of property, plant, and equipment. HLS report that the discretionary accruals in the MID portfolio are significantly greater than those in the UPP portfolio. However, they find no statistical differences between discretionary accruals in the LOW and MID portfolios. This is inconsistent with Healy's prediction that managers manipulate discretionary accruals to maximize their bonuses. Using earnings before discretionary accruals to classify firm-year observations into portfolios, GGA report income-increasing accruals for firm-years in the LOW portfolio, which is consistent with an income-smoothing hypothesis. Under the assumption of a fixed target, smoothing results in reduced earnings variability.

In addition to differences in the measurement of discretionary accruals described above, we attribute the ambiguous results to two major issues related to the empirical tests of Healy's hypothesis: (1) aggregation of financial data, and (2) managers' conflicting incentives to manage earnings. These issues are discussed in Section 2.2. Section 2.3 describes how these problems are mitigated in our setting, allowing for more powerful tests of the bonus-maximization hypothesis.

### ***Contextual limitations of prior studies***

Prior studies collect financial information from publicly-reported sources that are aggregated at the firm level. Aggregation of discretionary accruals by individual managers limits the power of tests in previous studies. For example, consider a firm that consists of two business units. Each business-unit manager's bonus is based on actual business-unit performance relative to target performance. Given each business unit's target and actual earnings measures, one business-unit manager may have incentive to make income-increasing discretionary accruals while the other manager may be motivated to use discretionary accruals to decrease reported earnings. On an aggregate basis, evidence of earnings management is not likely to be detectable.

**Table 1: Comparison of this study to prior research**

	<i>Healy (1985)</i>	<i>HLS (1995)<sup>a</sup></i>	<i>GGA (1995)<sup>a</sup></i>	
Sample selection	Companies listed in the 1980 Directory of the 250 largest U.S. industrial corporations.	Two confidential databases from consulting firms.	Proxy statements included in the 1986 Q-file, (Q-Data).	
Bonus funding data	Obtained from proxy statements	Self-reported from survey including salary, target bonus, minimum bonus, maximum bonus and actual bonus.	Obtained from proxy statements	
Financial data	Compustat	Compustat	Compustat	
Sample time period	1930-1980	1982-1984 1987-1991	1980-1990	
<b><i>Proxy for discretionary accruals</i></b>				
Total accruals	X	X	X	
Modified jones model		X	X	
Market index model		X	X	
Inventory reserve Method of portfolio separation				
Lower bound portfolio	Earnings below the lower bound of the funding formula	No Bonus Paid	Earnings before discretionary accruals fall below the lower bound.	No Bonus Paid
Upper bound portfolio	Cash flow from operations exceed the upper bound	Bonus paid equal to the maximum under the plan.	Not applicable	Bonus paid equal to the maximum under the plan
Middle bound portfolio	All observations not classified into upper or lower bound portfolios.	All observations not classified into upper or lower bound portfolios.	All observations not classified into lower bound portfolio.	All observations not classified into upper or lower bound portfolios.

**Overall results**

UPP accruals versus MID accruals	UPP accruals < MID accruals (significant)	UPP accruals < MID accruals (significant)	Not tested	UPP accruals < MID accruals (significant)
LOW accruals versus MID accruals	LOW accruals < MID accruals (significant)	LOW accruals not significantly different from MID accruals	LOW accruals > MID accruals- consistent with income smoothing.	LOW accruals < MID accruals (significant).

<sup>a</sup>*HLS is Holthausen, Larcker and Sloan (1995), GGA is Gaver, Gaver and Austin (1995), and GLR is Guidry, Leone, and Rock (1999).*

Conflicting incentives also limit the power of tests of the bonus-maximization hypothesis. In an effort to maximize their wealth, managers must consider the joint effect that discretionary accrual decisions have on their reputation, stock ownership, stock-based compensation, and earnings-based bonuses. However, previous research suggests that reputation, stock ownership, and stock-based compensation induce managers to engage in different earnings-management behaviour. For example, several studies suggest that income smoothing leads to higher share prices (Hunt et al., 1995; Trueman and Titman, 1988; Moses, 1987) giving managers with significant stock holdings or stock-based compensation incentive to smooth earnings. With respect to reputation, DeFond and Park (1997) report evidence consistent with theory developed by Fudenberg and Tirole (1995) that managers smooth earnings to enhance their reputation or mitigate the threat of displacement.

The research described above suggests that managers have competing incentives to engage in income smoothing (reputation, stock ownership, and stock-based compensation) or bonus-maximization (earnings-based bonus) behaviour. Consequently, in settings where incentives to smooth earnings dominate incentives to engage in bonus-maximization behaviour, it is more difficult to detect an association between managers' short-term bonuses and their earnings-management decisions. This is because the benefits from smoothing earnings outweigh the benefits from bonus maximizing.

Given the structure of senior-level management compensation, it is likely that the senior-level executives in previous studies have more incentive to smooth earnings than to maximize bonuses. Lewellen et al. (1987) report that the mean value of managers' own-firm common shareholdings plus stock-related compensation is almost thirty times the mean value of salary plus earnings-based bonus. Also, GGA report that for 91.6% of their firm-year observations, a stock option or restricted stock plan was in place in addition to a bonus plan. Consequently, the effects of stock compensation and ownership, along with reputation effects, dominate managers' earnings-management decisions, making it difficult for previous studies to analyse the impact of earnings-based bonus plans on earnings-management decisions. In contrast, income-smoothing incentives arising from stock ownership and stock-based compensation are absent in this setting.



### **Mitigating aggregation and conflicting incentive problems**

To mitigate the effects of aggregation and conflicting incentives, we study the business units of the U.S. division of a large multinational conglomerate. This firm offers a rich setting for this study for several reasons.

First, the decentralized organizational structure is conducive to incentive compensation based on earnings rather than stock or stock options. The only explicit incentives for the firm's U.S. managers are short-term earnings-based bonuses. Second, business-unit managers have insignificant holdings in the firm's stock. Third, there are a large number of independent business units operating in the U.S., thereby providing a sufficient sample size for rigorous statistical analysis. Fourth, the firm provided the bonus formula and targets, which permit more precise determination of the upper and lower bounds for portfolio construction. Finally, centralized accounting policies preclude managers from using alternative accounting rules to manipulate earnings. Since the parent makes GAAP decisions such as LIFO vs. FIFO, discretionary accruals are a more important component of earnings management for business-unit managers. In summary, our setting allows us to address the issues of aggregation and conflicting incentives which we believe, along with measures of discretionary accruals, lead to ambiguous results in previous tests of the bonus-maximization hypothesis.

#### **The Firm**

This study examines the business units of the U.S. division of a large multinational conglomerate that manufactures a wide range of products. Most of the operations are in mature industries and all operate independently of each other. The growth of the firm in the United States has been primarily from the acquisition of closely-held corporations that subsequently operate as independent business units. The level of intra firm transactions is relatively low, so we do not consider earnings management effected by transfer pricing in our analysis.

The company's management control system is driven by a sophisticated financial reporting system. By relying heavily on this system to monitor and evaluate performance, the parent reduces the need for costly layers of management to oversee business units. The system includes integrated budgeting, monthly management reporting, financial reporting, and tax reporting. Actual year-end earnings before interest and taxes, compared to budgeted performance measures, are used as the basis for the company's management incentive compensation for business-unit managers, as described in Section 4.1.

Our sample consists of 103, 135, and 115 independent business units operating during 1995, 1994, and 1993, respectively. Changes in the number of business units over the three-year period are the result of acquisitions and disposals.

Business-unit-year observations are constructed from a business unit's current period financial results and its prior year balance sheet. Because each business-unit-year observation requires the prior year's balance sheet information, the final sample contains complete business-unit-year observations for 117 different business units and 179 business-unit-years over the 1994–1995 time period.

The financial data for each business unit were extracted from the division's corporate reporting database, which serves as the source for both internal and external reporting. As presented in Table 2, the operating units in the final sample of 179 business-unit-years report mean and median sales of \$37.25M and \$24.02M, respectively. Mean (Median) earnings before interest and taxes (EBIT) are \$6.06M (\$3.50M) and mean (median) average net assets are \$18.15M (\$10.09M). Total accruals average - \$710K across business units and the median total accrual is - \$240K. These negative values likely reflect the influence of depreciation expense.

As mentioned previously, incentive compensation consists solely of a short-term bonus based primarily on EBIT. The same bonus computation is used for all operating units with a maximum bonus set at 30% of annual salary. While salaries vary across business units as a function of unit size, negotiated starting salaries, etc., the potential bonus seems to be sufficient to motivate performance and earnings management. The bonus formula is described in the next section.

**Table 2: Descriptive statistics - 179 business unit-year observations from 1994 and 1995 (in millions of dollars)**

<i>Measure</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Q1</i>	<i>Median</i>	<i>Q3</i>
Sales	37.25	43.67	11.45	24.02	45.28
EBIT	6.06	7.10	1.53	3.50	8.04
Average Net Assets	18.15	33.73	4.66	10.09	18.42
(Unsealed) Accruals	-0.71	2.63	-1.30	-0.24	0.45

EBIT = Earnings before interest and taxes

$$ACC_{i,t} = - DEP_{i,t} + \Delta AR_{i,t} + \Delta INV_{i,t} + \Delta OCA_{i,t} - \Delta AP_{i,t} - \Delta OCL_{i,t}$$

Where:

$ACC_{i,t}$  = business unit i's total accruals for year t

$DEP_{i,t}$  = business unit i's depreciation expense in year t

$\Delta AR_{i,t}$  = business unit i's net accounts receivable in year t less net accounts receivable in year t-1

$\Delta INV_{i,t}$  = business unit i's net inventory in year t less net inventory in year t - 1

$\Delta OCA_{i,t}$  = business unit i's other non-cash current assets in year t less other non-cash current assets in year t - 1

$\Delta AP_{i,t}$  = business unit i's accounts payable in year t less accounts payable in year t - 1

$\Delta OCL_{i,t}$  = business unit i's other current liabilities in year t less other current liabilities in year t- 1

## RESEARCH DESIGN, ANALYSIS AND RESULTS

To test the bonus-maximization hypothesis, we construct three portfolios [a lower bound portfolio (LOW), a middle portfolio (MID) and an upper bound portfolio (UPP)] using the bonus plan provided. To enhance comparability, several methods are used to estimate



discretionary accruals including those from previous studies. After constructing the three portfolios and computing discretionary accruals, portfolio means and distributions are compared.

### Research Design

Portfolios are constructed using budget and actual financial data and the incentive compensation rules defined in the bonus plan. Operating budgets are submitted by business-unit managers and approved by headquarters. These budgets, which serve as performance targets, are the basis for incentive compensation. Bonuses are determined by comparing actual performance to target for EBIT, return on sales (ROS), and return on net assets (RONA). Each performance measure is weighted equally and the business-unit managers earn bonuses by exceeding 80% of the target performance level. Bonuses increase linearly from the 80% level to 100% of target on each dimension. The maximum possible bonus is earned when the target performance level is achieved on all three dimensions.

The business-unit manager is eligible for a maximum bonus of \$30,000, based on three equally weighted measures. The following pertains to Business Unit 1 (BU1).

	Plan	Actual	Actual/Plan
EBIT	3,645	3,877	1.06
ROS	23.40%	22.00%	0.94
RONA	64.50%	60.00%	0.93

Managers receive five percent of the maximum bonus for each point (.01) above .80 of planned performance (Actual/Plan) up to a maximum of .20 for each measure. The total percent is then multiplied by the maximum bonus in each category. Continuing with the information above, the total bonus is computed as follows:

	(a)	(b)	(c)	(d)
	Actual/Plan	Points above .80, up to a maximum of .20	Total percent credit for criteria $T(b) \times 51$	Total Bonus [(c) * \$ 10,000]
EBIT	1.06	0.20	100%	\$10,000
ROS	0.94	0.14	70%	7,000
RONA	0.93	0.13	65%	6,500
Total				\$23,500

*Fig. 1. Represent bonus calculation.*

As an example, consider the scenario presented in Fig. 1. In this example, the manager of Business Unit 1 is eligible to receive a maximum bonus of \$10,000 for each dimension of performance. The ratio of actual to budgeted performance is calculated for

each performance measure, resulting in 1.06, 0.94, and 0.93 for EBIT, ROS, and RONA, respectively. For each performance measure, the business-unit managers receive five percent of the maximum bonus amount for each point (0.01) above 0.80 of planned performance, up to a maximum of 0.20. This yields bonus percentages of 100% ( $0.20 \times 5$ ), 70% ( $.14 \times 5$ ), and 65% ( $.13 \times 5$ ) for EBIT, ROS and RONA, respectively. This results in a bonus of \$10,000 ( $100\% \times \$10,000$ ) for EBIT, \$7,000 ( $70\% \times \$10,000$ ) for ROS, and \$6,500 ( $65\% \times \$10,000$ ) for RONA, giving a total bonus of \$23,500. As illustrated in this example, managers can increase their bonuses in the current year by making income-increasing accruals when earnings before discretionary accruals is sufficiently close to 80%, but less than 100% of plan under any of the three measures.

Like HLS, we assign business-unit-year observations to one of three portfolios based on the actual bonuses received by business-unit managers. Observations are assigned to portfolios in the following manner:

**Lower bound portfolio (LOW)** — Business-unit-years are classified as LOW when business-unit managers earn no bonus for the current year. No bonus implies that actual business-unit performance is below 80% of target on all three dimensions.

**Upper Bound Portfolio (UPP)** — Business-unit-years are classified as UPP if business-unit managers earned their maximum available bonus. This implies that all three performance targets are matched or surpassed in that year.

**Middle Bound Portfolio (MID)** — Business-unit-years are classified as MID when some, but less than the maximum available bonus is earned. Since each performance measure is increasing in EBIT, business-unit managers can augment their bonuses by managing earnings upward to the point where the target is met on all three dimensions. Hence, within this group, managers have incentives to make income-increasing accruals.

### Measures of Discretionary Accruals

To enhance the comparability of this study's results with those of previous studies, multiple measures of discretionary accruals are used. Similar to Healy (1985), we calculate our first measure of discretionary accruals, total accruals, as the change in non-cash current assets minus the change in current liabilities less depreciation expense. Taxes and interest payable are excluded from this computation because business-unit managers are eligible for bonuses based on earnings before interest and taxes and, as such, have no bonus-related incentives to manage these accounts.

A modified version of the Jones (1991) model applied on a pooled, cross-sectional basis is used to obtain the second measure of discretionary accruals. We estimate a cross-sectional model because there are at most two years of observations for business units in the sample (De Fond and Jiambalvo, 1994; Subramanyam, 1996). The model is modified by subtracting the change in accounts receivable from the change in revenue in an effort to enhance the possibility of capturing revenue-related earnings management (Dechow et al., 1995). Dechow et al. report that among the discretionary accrual models that they consider, their modified version of the Jones (1991) model provides the most power in detecting earnings management. Hence, the second measure of discretionary accruals is the residual from the following estimated regression equation with subsequent scaling by beginning-of-year business-unit total assets:

$$ACC_{i,t} = \alpha_0 + \alpha_1 (\Delta Revenue_{i,t} - \Delta AR_{i,t}) + \alpha_2 PPE_{i,t} + \epsilon_{i,t} \quad (1)$$

Where  $ACC_{i,t}$  is the business unit  $i$ 's total accruals in year  $t$ ,  $ARevenue_{itt}$  is business unit  $i$ 's revenue in year  $t$  less revenue in year  $t - 1$ ,  $AAR_{i,t}$  is business unit  $i$ 's net accounts receivable in year  $t$  less net accounts receivable in year  $t - 1$ ,  $PPE_{i,t}$  and business unit  $i$ 's net property, plant and equipment in year  $t$ .

As Bernard and Skinner (1996) suggest, we also consider a discretionary accrual measure generated from the analysis of a specific account [similar to the approach of McNichols and Wilson (1988)]. We do this for two reasons: (1) to provide a complementary means of testing for earnings management (DeAngelo, 1988), and (2) to focus on behavior related to a specific account in which earnings management is expected to manifest itself, thereby providing a more precise proxy for discretionary accruals.

A deterministic relation is assumed between the change in operating activity and the expected change in the account of interest, reserve for inventory obsolescence. McNichols and Wilson (1988) study behavior related to changes in the allowance for uncollectible accounts balance. However, based on discussions with business-unit managers, the inventory reserve account provides more opportunity for earnings manipulation in our sample. This is likely because information asymmetry exists between business-unit managers and their superiors about the value of inventory (and the likelihood that inventory will become obsolete) because of the relatively sophisticated nature of the manufactured products. Based on these arguments, a third measure of earnings management is calculated from an inventory reserve account model based on the expectation that the level of the reserve is related to the level of inventory. Schipper (1989) suggests that when using a single account approach, some assumptions must be met in order for test results to be interpretable. Notably, the account must be a reasonable proxy of discretionary accruals, material, and at least partially discretionary. Our inventory reserve account meets these:

$$INVEM_{i,t} = [INVRES_{i,t} - (INVRES_{i,t-1} (1 + \% \Delta GRINV_{i,t}))] / TA_{i,t-1},$$

Where  $INVRES_{i,t}$  is business unit  $i$ 's inventory reserve account balance in year  $t$ ,  $\% \Delta GRINV_{i,t}$  is business unit  $i$ 's percentage change in gross inventory from year  $t - 1$  to year  $t$   $[(GRINV_{i,t} - GRINV_{i,t-1}) / GRINV_{i,t-1}]$  and  $TA_{i,t-1}$  is business unit  $i$ 's total assets at the beginning of year  $t$ .

### Results of Tests of the Bonus-Maximization Hypothesis

Table 3 summarizes the results of the analysis for all three earnings management measures using both parametric (two-sample t-tests using a common or uncommon variance assumption as appropriate) and non-parametric (Wilcoxon two-sample tests with normal approximation) tests of differences in means and distributions among the portfolios, respectively. As a preliminary to discussing results, a comment on the frequency of observations in each portfolio vis-a-vis previous studies is in order. The majority of firm-year observations were classified in the MID portfolio in Healy (1985), HLS, and GGA (approximately 63%, 67%, and 70%, respectively). In this sample, approximately 40% of business-unit-year observations are evenly distributed between the LOW and MID portfolios and 60% of the sample observations are in the UPP portfolio. While the distribution across portfolios varies substantially from previous work, it is consistent with Merchant and Manzoni (1989) who report that most intrafirm performance targets are set at achievable levels. Ex-ante, there appears to be no implication for differences in findings based on differences in the proportion of observations in each portfolio.

Absent the potentially conflicting incentives of long-term performance plans, stock ownership, and stock-related compensation plans, managers are expected to exercise influence over accruals in a manner consistent with Healy's bonus-maximization hypothesis. Row 1 of Table 3 provides evidence largely consistent with his hypothesis. Specifically, the difference between the scaled mean total accruals (Healy's measure) in the middle portfolio (MID) (0.016) and the mean of the upper bound portfolio (UPP) (-0.020) is statistically significant ( $t = 1.39$ ,  $p = 0.08$  (one-tail)).<sup>13</sup> Hence, business-unit accruals by managers with incentives to manage earnings upward are, on average, almost four percent higher, as a percentage of total assets, than business-unit accruals by managers with incentives to manage earnings downward. While the non-parametric measure of the relation between these two portfolio distributions is in the hypothesized direction, it is not significant ( $Z = 1.07$ ,  $p = 0.142$ ). Note that the overall mean scaled total accrual (across portfolios) is negative ( $-0.021$ ) consistent with the notion that depreciation is a major component of total accruals.

**Table 3: Mean (Median) measures of discretionary accruals with portfolios of firm-year observations formed by position relative to minimum and maximum bonus thresholds; sample sizes in parentheses**

	Portfolio			
	Overall	LOW	MID	UPP
Discretionary accrual Measure	[n = 179]	[n = 37]	[n = 36]	[n = 106]
Healy model	- 0.021 (- 0.029)	- 0.060*** (- 0.058) # **	0.016 (- 0.007)	- 0.020* (- 0.026)
Modified Jones model	0.023 (0.019)	-0.001*** (0.010)##	0.090 (0.045)	0.010** (0.014) ##
Inventory reserve account model	0.002 (0.000)	- 0.002*** (0.000) **	0.011 (0.000)	0.001** (0.000) **

\*\*\*, \*\*, \* - significantly different from the MID Portfolio at the 1%, 5%, and 10% levels (one-tailed), respectively using t-tests of differences in means assuming equal or unequal variances as indicated by test.

###, ##, # - significantly different from the MID Portfolio at the 1%, 5%, and 10% levels (one-tailed), respectively using Wilcoxon 2-sample test (with normal approximation)

**LOW** - lower bound portfolio where managers of the business units earned no bonus for the year.

**MID** - middle bound portfolio where managers of the business units earned some, but less than the maximum, bonus for the year.

**UPP** - upper bound portfolio where managers of the business units earned the maximum bonus possible for the year.

**Healy model** - Discretionary accrual proxy is total accruals scaled by total assets at the beginning of the year ( $TA_{i,t-1}$ ), where total accruals are calculated as:

$$ACC_{i,t} = -DEP_{i,t} + \Delta AR_{i,t} + \Delta INV_{i,t} + \Delta OCA_{i,t} - \Delta AP_{i,t} - \Delta OCL_{i,t}$$

**Modified jones model (residuals)** - Discretionary accrual proxy is the residual from the following estimated regression equation subsequently scaled by  $TA_{i,t-1}$ .

$$ACC_{i,t} = \alpha_0 + \alpha_1 (\Delta Revenue_{i,t} - \Delta AR_{i,t}) + \alpha_2 PPE_{i,t} + \epsilon_{i,t}$$

*Inventory reserve account model - Discretionary accrual proxy is deviation from the following expectation model:*

$$INVEM_{i,t} = [INVRES_{i,t} - (INVRES_{i,t-1} (1 + \% \Delta GRINV_{i,t}))] / TA_{i,t-1}$$

The accrual behavior of managers in the LOW portfolio is also consistent with the bonus-maximization hypothesis using Healy's total accrual measure. The mean accruals scaled by total assets at the beginning of the year for the LOW portfolio ( $-0.060$ ) is significantly lower than that of the MID portfolio ( $t = 2.39$ ,  $p = 0.01$ ). The non-parametric test provides consistent evidence ( $Z = 2.45$ ,  $p = 0.007$ ). These results suggest that business-unit managers who are unlikely to earn a bonus in a given year rationally 'take a bath' (exercise income-decreasing discretionary accrual behavior) to increase the probability of receiving a bonus in subsequent years. These results should be considered in light of the oft-alluded-to selection bias problem in comparing LOW to MID portfolio accrual behavior. That is, as firms' (business units') total accruals become more negative, their earnings before interest and taxes become lower, thereby increasing the likelihood of being assigned to the LOW portfolio (GGA; and Dechow et al., 1996). In this paper, the modified Jones model and the specific account analysis conducted below are used to mitigate this problem to some degree.

The modified Jones model is estimated using pooled cross-sectional observations. The adjusted R<sup>2</sup> of the model is .25, and the coefficients on change in sales minus change in accounts receivable, and property, plant, and equipment are both significant and in the appropriate direction (i.e., positive and negative, respectively). Results (reported in row 2 of Table 3) of the analysis of discretionary accrual behavior of managers in the various portfolios are consistent with Healy's theory and the results reported above. Specifically, the mean level of scaled discretionary accruals of business units in the MID portfolio (0.090) is significantly higher than that of business units in the UPP portfolio (0.010) ( $t = 2.35$ ,  $p = 0.011$ ). The non-parametric measure of differences in the distributions of discretionary accruals is in the hypothesized direction and is also significant ( $Z = 2.16$ ,  $p = 0.015$ ).

The discretionary accrual measures from the modified Jones model ( $\Sigma_{i,t} / TA_{i,t-1}$ ) provide evidence consistent with managers' bath-taking behavior and inconsistent with smoothing behavior when comparing the distributions of discretionary accruals in the LOW versus the MID portfolios. The mean deflated discretionary accrual of the MID portfolio (0.090) is higher than the mean deflated discretionary accrual of the LOW portfolio ( $-0.001$ ), and the difference in means is significant ( $t = 2.49$ ,  $p = 0.008$ ). Non-parametric tests provide identical inferences ( $Z = 2.10$ ,  $p = 0.018$ ). Therefore, this model of discretionary accruals provides similar evidence of differences in behavior of managers in MID and LOW portfolios. Managers who are in the LOW portfolio appear to take income-decreasing discretionary accruals relative to managers in the MID portfolio.

Perhaps the strongest evidence of earnings-management behavior in this study is provided by the analysis of the inventory reserve account. This account affords business-unit managers an opportunity to manage earnings in a manner less likely to be challenged by senior management. Row 3 of Table 3 provides evidence consistent with managers using the discretionary component of the inventory reserve to maximize their bonuses. The mean 'unexpected' inventory accrual scaled by beginning total assets for the MID portfolio is 0.011 versus 0.001 for the UPP portfolio. The difference between portfolio means is significant ( $t = 1.78$ ,  $p = 0.039$ ). While the difference between means may not appear to be economically

significant as a percentage of total assets (1.0%), it does represent a more substantial percentage of earnings before interest and taxes (7.5%). Row 3 provides similar evidence with respect to non-parametric measures ( $Z = 1.91$ ,  $p = 0.028$ ). Since the Wilcoxon two-sample test is a test of differences in distributions, not medians, we report significant differences though the medians are equal.

The results of tests of differences between the LOW and MID portfolios reported in row 3 of Table 3 also support the bonus-maximization hypothesis. The mean discretionary accrual for the MID portfolio (0.011) generated using the inventory reserve account model is significantly higher than the mean of the LOW category ( $-0.002$ ) ( $t = 2.36$ ,  $p = 0.01$ ). The non-parametric Wilcoxon two-sample test indicates the same relation ( $Z = 1.85$ ,  $p = 0.032$ ). Unlike HLS and GGA, we find robust evidence that managers who do not receive bonuses in a given year exhibit income-decreasing behavior relative to managers who are in the bonus range and have incentive to manage earnings upward.

The results are fairly robust to the manner in which non-discretionary accruals are measured, with the exception of non-parametric tests using total accruals, where the results are in the hypothesized direction, but insignificant.

We also estimate the economic significance of the business-unit managers' motivation to engage in bonus-based earnings management using the data in the study. Specifically, based on the assumptions that the average business unit manager salary is \$100,000 per year and that the maximum bonus is 30% of salary, we calculate the average amount that bonuses increase as a result of discretionary accruals for business units in the MID portfolio. MID portfolio observations are used so that no assumptions are necessary regarding accrual reversals and portfolio categorization in the subsequent year. We employ discretionary accruals generated by both the modified Jones model and the inventory reserve model. Based on the modified Jones model residuals, we estimate that the average bonus increases by over \$9000 per year or 60% over the level of bonus absent discretionary accruals. The average bonus increases by almost \$3000 based on the inventory reserve model measure of discretionary accruals or 15% over the level of bonus absent discretionary accruals. The impact estimated using the inventory reserve measure is likely to be a conservative estimate relative to the estimate using the Jones model residuals because it only includes the earnings management of one account.

One caveat to our results is that the relation between the LOW and MID portfolios could be induced to some degree by our portfolio partitioning rule. Particularly, this could be the case with the total accrual measure of discretionary accruals. To a lesser extent, the same may be true of the modified Jones model-generated residuals, though Dechow et al. (1995) suggest that this may be the best available technology for estimating discretionary accruals. However, this is less likely using the inventory accrual measure because EBIT and discretionary inventory accruals are not significantly correlated. We consider income smoothing as an alternative explanation for the relation between MID and LOW portfolios in the next section among other incentives to manage earnings.

### **Tests of Alternative Incentives to Manage Earnings**

In this subsection, we consider three additional incentives that business-unit managers are likely to face in making discretionary accrual decisions. The first addresses the competing incentive to smooth earnings arising from reputation considerations. The second acknowledges that group managers (superiors) may exert influence over business-unit



managers to maximize the superiors' bonuses. The third type of alternative incentive we consider relates to managers' propensity to 'take a bath' during their first year of tenure to increase the probability of being rewarded for future performance.

### **Tests of income smoothing versus the Bonus-Maximization Hypothesis**

As discussed in Section 2.2, reputation concerns or the threat of displacement, are likely to give managers an incentive to smooth earnings (DeFond and Park, 1997). While other incentives to smooth earnings (stock options and stock-ownership) are naturally controlled for in this setting, incentives to smooth from reputation are not. To the extent that reputation concerns dominate gains from bonus maximization, managers may choose to smooth earnings. Given the results reported in Table 3, the evidence is more consistent with bonus maximization than with smoothing. However, given the evidence of smoothing reported in other studies (e.g., DeFond and Park, 1997, GGA), we conduct tests of income smoothing behavior to determine whether income smoothing can be detected despite the presence of bonus-maximizing managers.

HLS test a smoothing hypothesis by considering the discretionary accruals of firms with earnings between the target earnings level and the upper bound versus firms with earnings between the lower bound and the target earnings level. However, with this firm's bonus plan, the upper bound is the budget amount and, as such, the target. Therefore, the test comparing the predictive ability of the bonus-maximization and smoothing hypotheses is conducted by combining portfolios. Specifically, one test of the bonus-maximization hypothesis is to combine the LOW and UPP portfolios and compare the combined portfolio to the MID portfolio. In the combined portfolio, the incentives are aligned since both are expected to exhibit income-decreasing discretionary accrual behavior relative to the MID portfolio. Alternatively, if managers use discretionary accruals to smooth measured performance, then business units below the budget (MID and LOW portfolios) will exhibit income-increasing discretionary accruals and those above the budget amount will exhibit income-decreasing discretionary accruals. Tests of these competing hypotheses are summarized in Table 4.

Consistent with the results from Table 3, we provide evidence of discretionary accrual behavior indicative of incentives described by the bonus-maximization hypothesis in Table 4. The difference in mean accruals between the combined LOW and UPP portfolios and MID portfolio using all three discretionary accrual measures are statistically significant at the  $p = 0.05$  level or lower. Non-parametric tests offer the same inferences. In contrast, Table 4 provides little evidence in support of income-smoothing behavior on the part of managers, assuming income smoothing is manifested in income-increasing discretionary accruals when managers are below budget and income-decreasing discretionary accruals when managers are above budget. While the observed relation is in the direction characterized by income smoothing using one of the three measures of discretionary accruals (i.e., LOW and MID-combined portfolio Jones-model residuals equal 0.044, which is greater than 0.010 for the UPP portfolio), it is only significant using parametric tests ( $t = 1.50$ ,  $p = 0.069$ ). Clearly, the MID portfolio observations drive this result. Hence, unlike GGA, who report evidence consistent with income smoothing at the lower bound, we find little evidence of that behavior in our sample.

Unlike previous studies that investigate earnings-management behavior by top management, we focus on business-unit-level managers for the reasons described above.



Using the business unit as our level of analysis increases the possibility that superiors at the group level exercise influence over business-unit managers to make group-level results consistent with incentives at that level. The earnings-based bonus plan described for the business-unit managers is also used at the group level. The next section reports on tests of the influence of group managers on the discretionary accrual behavior of business-unit managers.

**Table 4: Comparison of bonus-maximization versus smoothing hypotheses - mean (median) discretionary accrual measures**

	Bonus-maximization		Smoothing	
	LOW and UPP [n = 143]	MID [n = 36]	LOW and MID [n = 73]	UPP [n = 106]
Discretionary accrual measure				
Healy model	-0.031** (- 0.034) **	0.016 ( - 0.007)	- 0.022 ( - 0.030)	- 0.020 ( - 0.026)
Modified Jones model	0.007*** (0.013)* ##	0.090 (0.045)	0.044* (0.032)	0.010 (0.014)
Inventory Reserve account model	0.001** (0.000) **	0.011 (0.000)	0.004 (0.000)	0.001 (0.000)

\*\*\*, \*\*, \* - in bonus-maximization test, significantly different from MID portfolio at the 1%, 5%, and 10% levels (one-tailed), respectively using *f*-tests of differences in means assuming equal or unequal variances as indicated by test; in smoothing test, significantly different from UPP portfolio at same levels of significance.

###, ##, # - in bonus-maximization test, significantly different from MID portfolio at the 1%, 5%, and 10% levels (one-tailed), respectively using Wilcoxon 2-sample test (with normal approximation); in smoothing test, significantly different from UPP portfolio at same levels of significance. LOW - lower bound portfolio where managers of the business units earned no bonus for the year. MID - middle bound portfolio where managers of the business units earned some, but less than the maximum, bonus for the year.

UPP - upper bound portfolio where managers of the business units earned the maximum bonus possible for the year.

### Upper Management Incentives and Business-Unit Managers' Accruals

An implied assumption in the analysis above is that business-unit managers have an information advantage over senior management, and hence are not substantially influenced by senior management when making earnings-management decisions. However, since group managers have bonus plans similar to those of business-unit managers, they have incentive to influence business-unit managers' behavior. Consequently, we perform tests of group managers' influence on business-unit managers' earnings management decisions.

There are eleven groups in our sample of business units, with the number of business units in any group ranging from five to fifteen. We perform additional tests by partitioning each business-unit-year observation based on group performance relative to plan, rather than individual business-unit performance, to determine if group managers systematically influence the discretionary accruals of business units. For example, if a group manager receives no bonus in a year, which is the criterion for assignment to the LOW portfolio, all business units in that group are assigned to the LOW portfolio. This is in

contrast to earlier tests which partition business-unit-year observations based on business-unit manager performance relative to plan. Group performance represents an aggregation of the business units in the group with eliminations and some administrative charges. The results in Table 5 indicate that there are no significant differences in mean discretionary accruals using any measure of discretionary accruals.

**Table 5: Mean (median) measures of discretionary accruals with portfolios of firm-year observations formed using group performance to construct portfolios**

Discretionary accrual measure	Portfolio		
	LOW	MID	UPP
	[n = 19]	[n = 38]	[n = 121]
Healy model	0.001 (-0.019)	- 0.030 ( - 0.042)	- 0.022 ( - 0.024)
Modified Jones model	0.035 (0.074)	0.033 (0.023)	0.019 (0.020)
Inventory reserve account model	0.001 (0.000)	0.001 (0.000)	0.003 (0.000)

\*\*\*, \*\*, \* - significantly different from the MID portfolio at the 1%, 5%, and 10% levels (one-tailed), respectively using t-tests of differences in means assuming equal or unequal variances as indicated by test.

###, ##, # - significantly different from the MID portfolio at the 1%, 5%, and 10% levels (one-tailed), respectively using Wilcoxon 2-sample test (with normal approximation)

LOW - lower bound portfolio where managers of the groups earned no bonus for the year.

MID - middle bound portfolio where managers of the groups earned some, but less than the maximum, bonus for the year.

UPP - upper bound portfolio where managers of the groups earned the maximum bonus possible for the year.

One observation is excluded from this analysis because one business unit reported to different group managers during the test period.

As a second test of group manager influence and aggregation effects, we aggregate business-unit discretionary accruals to create and analyse group-year observations. Specifically, for each group, unsealed business-unit discretionary accruals are aggregated and divided by total group assets. There are a total of 17 group-year observations. Using the same partitioning criteria described above, we classify four group-year observations in LOW, three in MID and ten in UPP. Using the modified Jones model residual proxy for discretionary accruals, we find that discretionary accruals are not significantly different from zero in any of the portfolios, nor do the discretionary accruals differ across portfolios. Overall, the results suggest that group managers have minimal influence on business-unit managers' discretionary accrual decisions. Further, the discretionary accruals at the business-unit level do not appear to aggregate to the group level in any systematic way. However, given the small number of group-level observations, it is difficult to make inferences based on failure to reject the null.

These results, coupled with those reported in Table 3 suggest that sufficient information asymmetry exists for the business-unit managers to control the discretionary accruals of the business units. However, while the results suggest that group managers are unable to manage earnings by influencing business-unit managers' accrual decision, one cannot conclude that group managers are unable to manage earnings at the group level. For example, they could manipulate earnings by making administrative adjustments at the group level, or by buying and selling business units. These manipulations would not be (and are not intended to be) captured in our tests.

### **Earnings Management and Business-Unit Manager Turnover**

In this sub-section, we examine the relation between business-unit manager turnover and discretionary accruals. New business-unit managers may have reputation or bonus-based incentives to cause transition-year earnings to be lower (Murphy and Zimmerman, 1993; Pourciau, 1993). Motivation for transition-year bath taking includes increasing the prospects of appearing better in the future and, in a ratcheting target setting, lowering the subsequent target performance level. This motivation is particularly salient among what Pourciau (1993) refers to as 'non-routine' management changes. Transition-year bath taking represents a reason apart from the bonus plan to expect income-decreasing accruals in any of the three portfolios.

To test for this type of behaviour, we regressed all three measures of discretionary accruals on indicator variables representing membership in the LOW portfolio, membership in the UPP portfolio, and business-unit management change during the year as follows:

$$DA_{i,t} = \beta_0 + \beta_1 LOW_{i,t} + \beta_2 UPP_{i,t} + \beta_3 \Delta MGT_{i,t} + e_{i,t}, \quad (3)$$

Where  $DA_{i,t}$  is the business unit  $i$ 's discretionary accrual measure in year  $t$ ,  $LOW_{i,t}$  is 1 if business unit  $i$  is in the LOW portfolio in year  $t$ , and zero otherwise,  $UPP_{i,t}$  is 1 if business unit  $i$  is in the UPP portfolio in year  $t$ , and zero otherwise, and  $\Delta MGT_{i,t}$  is 1 if there is a change in manager for business unit  $i$  in year  $t$ , and zero otherwise.

There are 14 management changes among our 179 business-unit-year observations, four among both the LOW and MID portfolio observations and six among the UPP portfolio observations. The results of this analysis are reported in Table 6. Note that the intercept represents the mean discretionary accrual for business units with returning managers who earned some, but less than the maximum bonus for the current year's performance. The coefficient  $\beta_1$  represents the average differential discretionary accrual for business units with managers who earned no bonus for the current year.  $\beta_2$  is the average differential discretionary accrual for business units with managers earning the maximum bonus for performance in the current year. The coefficient  $\beta_3$  represents the differential discretionary accrual for business units managed by new managers independent of the level of bonus, if any, earned for the current year.

**Table 6: OLS regression of discretionary accruals by business unit-managers on indicator variables of bonus portfolio and business-unit manager turnover - parameter estimates (t-statistics)**

Discretionary accrual measure			
Variable	Healy model	Modified Jones model	Inventory reserve account model
Intercept	0.019 (0.846)	0.095*** (4.006)	0.010** (2.260)
LOW	- 0.076*** ( - 2.480)	- 0.092*** (-2.812)	-0.013** ( - 2.078)
UPP	- 0.038* ( - 1.495)	- 0.082*** ( - 3.053)	- 0.009** ( - 1.780)
$\Delta$ MGT	- 0.027 ( - 0.705)	- 0.039 ( - 0.993)	0.068 (0.950)
Adjusted $R^2$	0.020	0.045	0.015
Model F-Stat	2.91	3.81	1.93

\*\*\*, \*\*, \* - significantly different from 0 at the 1%, 5%, and 10% levels (one-tailed).

$$DA_{i,t} = \beta_0 + \beta_1 LOW_{i,t} + \beta_2 UPP_{i,t} + \beta_3 \Delta MGT_{i,t} + e_{i,t}$$

where

$DA_{i,t}$  = business unit  $i$ 's discretionary accruals in year  $t$

$LOW_{i,t}$  = 1 if business unit  $i$  is in the LOW portfolio in year  $t$ , 0 else

$UPP_{i,t}$  = 1 if business unit  $i$  is in the UPP portfolio in year  $t$ , 0 else

$\Delta MGT_{i,t}$  = 1 if there is a change in manager for business unit  $i$  in year  $t$ , 0 else

The results are consistent with those reported in Table 3 in that managers in the LOW and UPP portfolios appear to take income-decreasing discretionary accruals relative to managers in the MID portfolio. The sign of the coefficient (33) is consistent with new managers making transitional year income-decreasing discretionary accruals when proxied by total accruals and the modified Jones model, but not when proxied by the discretionary component of the inventory reserve. The coefficient, however, is not significant for any of the discretionary accrual measures. Overall, the results of this analysis suggest that even after controlling for business-unit manager turnover, discretionary accrual behaviour is consistent with the bonus-maximization hypothesis.

### Supplemental tests using earnings before discretionary accruals in portfolio classification

As described above, our business-unit-year observations are classified based on the bonuses received by business-unit managers. If, for example, a manager receives no bonus in a given period, the business-unit-year observation is classified in the LOW portfolio. In a latter part of their analysis, GGA classify firm-year observations into portfolios on the basis of earnings before discretionary accruals (thereby reversing estimated discretionary accruals from the earnings figure). While this approach to portfolio classification has merit, potential misclassifications could occur between the MID and LOW portfolios. As an example,

suppose a business-unit manager's earnings before discretionary accruals (EBDA) falls just below the lower bound of the performance target such that actual EBDA divided by target EBIT is 0.79 (with a lower bound at 0.80 of target EBIT). Using EBDA as the criteria, this observation is classified in the LOW portfolio. However, if the manager's available discretionary accruals are sufficiently large, he/she may choose to take income-increasing discretionary accruals and move into the bonus range. Hence, his/her unobservable lower bound is below 0.79 and this business-unit year should be classified in the MID portfolio.

While we do not advocate the classification of business-unit-year observations into portfolios on the basis of earnings before discretionary accruals due to the potential for misclassification, we conduct an analysis similar to GGA (1995) for comparison purposes and report our results below. EBDA is computed by subtracting discretionary accruals, estimated with the modified Jones model, from actual earnings. Business-unit-years are classified into the LOW (UPP) portfolio if actual performance using EBDA divided by target performance is below (above) the minimum (maximum) performance level required to receive a bonus for all three performance measures (EBIT, ROS, and RONA). All other business-unit-year observations are classified in the MID portfolio.

Using EBDA to classify business-unit-year observations into portfolios, we find that differences between the UPP and MID portfolios are similar to those described in the primary analysis above. The mean scaled discretionary accrual of the UPP portfolio (- 0.080) is significantly less than that of the MID portfolio (0.042),  $t = 5.84$ ,  $p < 0.001$ . The same conclusion results from non-parametric tests. This test is not conducted by GGA (1995) because they are unable to accurately categorize UPP observations. However, the mean scaled discretionary accruals of the LOW portfolio (0.120) is greater than that of the MID portfolio and the difference is significant ( $t = 2.84$ ,  $p = 0.01$ ). Hence, these results comparing the LOW and MID portfolios determined by earnings before discretionary accruals are similar to GGA.

In their study, GGA conduct additional tests to support their evidence of income smoothing, which differs from Healy's finding of bonus-maximization behaviour below the lower bound. Without this additional analysis, it could be argued that their results are attributable to the misclassification of firm years as described above. They divide observations in the LOW portfolio into those closest to the lower bound (LOW2) and those furthest from the lower bound (LOW1) and compare sub-portfolio means. They argue that if mean accruals in LOW2 are greater than LOW1, then their results are explained by bonus-maximization (i.e., managers of firms further away from the lower bound take income-decreasing accruals to increase the probability of earning bonuses in the future given that they have no chance in the current period). Alternatively, if LOW1 discretionary accruals are greater than LOW2 (firms further from the target take income-increasing discretionary accruals relative to firms close to the target) this would provide additional support for the income smoothing hypothesis. GGA find that mean discretionary accruals are larger for the LOW1 portfolio, consistent with income smoothing.

Given that managers in their setting likely have more incentive to smooth earnings due to alternative incentive structures (stock ownership and stock-based compensation), GGA's results are not surprising. However, in our setting, where business-unit managers' incentives are dominated by short-term bonuses, we suspect that our results using EBDA are not due to smoothing, but rather to misclassification (business-unit-year observations

classified in the LOW portfolio on the basis of EBDA, should actually be classified in the MID portfolio). Accordingly, we conduct an analysis similar to that of GGA, and report results of that analysis on Table 7.

The results reported in Table 7 are consistent with our misclassification argument and not income smoothing. Using all measures of discretionary accruals, the mean (and distribution) is greater for the half of the LOW portfolio closest to the lower bound (LOW2) than for the half of the LOW portfolio furthest from the lower bound (LOW1), though not significantly so for the inventory accrual measure. For example, the second row of Table 7 shows that the mean scaled discretionary accrual generated from the modified Jones model of the LOW2 sub-portfolio (0.187) is significantly greater than that of the LOW1 sub-portfolio (0.052). The findings in Table 7 are consistent with the notion that managers of business units who are close to the lower bound prior to any discretionary accrual manipulation rationally take income-increasing discretionary accruals to obtain bonuses based on the plan. Hence, this evidence largely corroborates that reported in previous tables with respect to behaviour of managers sufficiently close to the lower bound. The analysis of classification based on income before discretionary accruals is consistent with Healy's bonus-maximization hypothesis.

**Table 7: Mean (median) measures of discretionary accruals dividing the LOW portfolio into those observations closest and furthest from the lower bound, using earnings before discretionary accruals to classify portfolios**

Discretionary accrual model	LOW1 [n = 26]	LOW2 [n = 26]
Healy model	- 0.013*** (- 0.030)* ##	0.105 (0.047)
Modified Jones model	0.052*** (0.046)###	0.187 (0.109)
Inventory reserve account model	0.001 (0.000)	0.004 (0.000)

\*\*\*, \*\*, \* - significantly different from the LOW2 portfolio at the 1%, 5%, and 10% levels (one-tailed), respectively using t-tests of differences in means assuming equal or unequal variances as indicated by test.

###, ##, # - significantly different from the LOW2 portfolio at the 1%, 5%, and 10% levels (one-tailed), respectively using Wilcoxon 2-sample test (with normal approximation)

LOW 1 - portfolio of business-unit-year observations comprised from the lower half of the LOW portfolio (formed using income before discretionary accruals), or those furthest from the lower bound.

LOW 2 - portfolio of business-unit-year observations comprised from the upper half of the LOW portfolio (formed using income before discretionary accruals), or those closest to the lower bound.

Note: These business-unit-year observations are classified based on measures calculated using earnings before discretionary accruals and do not correspond to previous analysis.

## CONCLUDING REMARKS

This study examines whether U. S. business-unit managers of a multinational conglomerate manage earnings to maximize their short-term bonuses in a manner



consistent with Healy (1985). This research differs from previous research on earnings-based bonus plans and earnings management (Healy, 1985; HLS; GGA) in its use of business units as the level of analysis, rather than the aggregate firm. This setting permits several refinements to previous research examining the effect of earnings-based bonus plans on managers' earnings-management decisions. First, to the extent that earnings management takes place at the business-unit level, important information is lost through aggregation when studying firm-level discretionary accruals. Second, the setting naturally controls for the potentially confounding effects of stock-related compensation, long-term performance plans, and stock ownership by managers, which limit previous studies. Third, budgeted and actual performance data and a firm-specific bonus formula are used, allowing for more precise portfolio assignments. Finally, the discretionary accrual behaviour in the inventory reserve account is examined, given its susceptibility to earnings management in our setting.

The evidence is consistent with business-unit managers manipulating earnings to maximize their short-term bonus plans, using Healy's proxy for discretionary accruals, the modified Jones model measure, and an inventory reserve measure. The evidence suggests that managers of business units in the MID portfolio make income-increasing discretionary accruals relative to those in the UPP and LOW portfolios. The evidence is strongest in the analysis of the inventory reserve account. The results are probably more pronounced in this account because managers have the greatest opportunity to manipulate earnings given the information asymmetry likely to exist between the business-unit managers and upper management in inventory valuation.

The results also highlight the influence of internal contracting on external reporting. In their discussion of future research directions in positive accounting theory, Watts and Zimmerman (1990, p. 152) suggest that 'internal contracting parties may well turn out to be as important a determinant of external financial reporting as the external contracting parties'. To the extent that external financial reports reflect an aggregation of internal financial results, the results support this contention.

The most likely explanation for the difference between these results and those of HLS and GGA is the setting. Healy (1985), HLS, and GGA examine the extent to which senior-level managers manipulate earnings to maximize their short-term bonuses. However, senior-level managers often receive considerable remuneration in the form of stock options, and long-term performance plans and generally own stock in the company. To the extent that managers believe that they can influence the value of stock and stock options, they may pursue different earnings management strategies (such as smoothing). In this setting, earnings-based bonuses are likely to be a more dominant part of managers' objective functions.

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