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THE EFFECT OF ACCOUNTING PROCEDURE CHANGES
ON EXECUTIVES' REMUNERATION

Paul Healy,
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Sloan School of Management, M.I.T.
and
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June 1985

MIT Sloan School of Management Working Paper: #1668-85

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Second Draft. Not to be quoted.

We wish to thank Andrew Christie, Linda DeAngelo, Bob Kaplan, Rick Ruback, Ross Watts and Jerry Zimmerman for their helpful comments on earlier drafts of this paper. We are also grateful to Bob Holthausen and Richard Rikert for letting us use their data bases of changes in accounting procedures.

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1. INTRODUCTION

Management compensation plans written in terms of accounting numbers are a popular means of rewarding executives of U.S. corporations. These plans typically allow managers to receive bonus compensation if their performance exceeds a target that is stated in terms of accounting earnings. Watts (1977) and Watts and Zimmerman (1978) hypothesize that if it is costly to monitor these contracts, changes in accounting rules have economic consequences for the firm by changing its expected future cash flows and their distribution among its various claimants.

In this paper we examine whether, subsequent to an accounting policy change, top management's salary and bonus remuneration is based on earnings computed under the old or new accounting rules. If the costs of adjusting compensation for the effect of an accounting policy change are negligible, we expect awards still to be based on the old accounting rules. However, if adjustment is costly, compensation awards are likely to be based on the new rules.

The economic consequences of accounting changes are tested in earlier studies by Holthausen (1981), Leftwich (1981) and Collins, Rozeff and Dhaliwal (1981) using stock price data. They investigate the relation between variables chosen to proxy for monitoring costs and the cross-sectional variation in firms' abnormal stock price performance around the time of an accounting change. Their results are mixed and provide only weak support for the economic consequences hypothesis. However, as Holthausen and Leftwich (1983) point out, these tests are unlikely to detect the economic consequences of most accounting technique changes because their wealth effects are likely to be small relative to the variability in stock prices.

Further, the power of such tests is seriously limited by the difficulty in identifying the event dates and specifying investors' expectations. This paper attempts to mitigate these limitations by examining whether accounting procedure changes are associated with changes in top management remuneration.

Our sample consists of 52 companies that changed from the FIFO to LIFO inventory method, and 38 companies that changed from accelerated to straight-line depreciation. For each of these firms, we test whether there is a change in the time-series relation between executives' salary and bonus awards and reported accounting earnings following the accounting change. The results indicate that for our sample of companies, the relation between compensation and reported earnings does not change following an accounting policy change, irrespective of whether the change increases or decreases reported earnings. This implies that top management's salary and bonus payments are not adjusted for changes in reported earnings due to accounting policy changes.

The remainder of the paper is organized as follows. Section two describes the research design, sample selection and data collection. The results of the statistical tests are presented in section three and our conclusions are discussed in section four.

2. RESEARCH DESIGN

2.1 Management Compensation and Accounting Changes

In most large U.S. corporations managerial remuneration is tied to reported earnings. Fox (1980), for example, finds that in 1980 more than 90 percent of the 1000 largest U.S. manufacturing companies used some form of earnings-based compensation. The most popular schemes include bonus and performance plans. Bonus plans typically award managers cash payments if

certain annual targets are attained; performance plans award managers the value of performance units or shares in cash or stock if certain long-term (three to five-year) performance targets are achieved.¹ The targets in these plans are usually written in terms of earnings per share, return on assets or return on equity. Compensation can also be tied to earnings on an informal basis. For example, executives' salary revisions can be a function of earnings.

Compensation contracts are usually administered by a committee of directors who are ineligible to participate in the schemes. This committee has discretion to set managers' salaries and award bonus and performance plan payments.

Since compensation plan targets are stated in terms of accounting numbers, managers' wealth will be affected by voluntary or mandatory changes in accounting rules unless the compensation committees adjust awards to offset the effect of the rule changes. If the costs of adjusting compensation for changes in accounting policies are negligible, compensation plans can either specify the accounting rules used to compute earnings for remuneration purposes ex ante, or the plans can be adjusted ex post so that compensation payments are fully insulated from accounting rule changes. With costly monitoring, compensation committees weigh the benefits of insulating compensation payments from accounting rule changes against the associated costs.

If compensation payments are not fully insulated from the effects of accounting changes, managers have an incentive to voluntarily switch accounting policies to increase their compensation. However, two forces limit their incentives to opportunistically change accounting policies. First, if managers own shares in the firms that employ them, an accounting

rule change which reduces the value of the firm reduces their portfolio wealth. Second, if managers opportunistically take actions that do not maximize the value of their firms, the value of their human capital is likely to decline. Hence, in considering accounting changes, managers trade off the changes in their compensation against changes in their portfolio wealth and human capital.

To evaluate whether management compensation is fully adjusted by compensation committees for the effects of accounting changes, we examine two changes: changes from the FIFO to LIFO inventory method, and changes from accelerated to straight-line depreciation.² These accounting changes are chosen for investigation for a number of reasons. First, they have a large effect on reported earnings. Second, FIFO to LIFO switches typically decrease reported earnings, whereas changes from accelerated to straight-line depreciation usually increase reported earnings.³ Hence, if earnings-based management compensation is not adjusted for changes in accounting policies, the inventory policy change would decrease compensation and the depreciation change would increase it. Third, changes from FIFO to LIFO typically decrease a firm's tax payments and hence increase the equity value of the firm. From managers' perspectives, FIFO-LIFO switches are therefore likely to increase their portfolio wealth provided they own stock in the firms that employ them. Also, managers' decisions to change from FIFO to LIFO are likely to increase the value of their human capital since the decision benefits the shareholders. The increase in portfolio wealth and human capital may be sufficient to offset the reduction in managers' earnings-based compensation if no adjustment is made by the compensation committees. In contrast, the depreciation policy changes are tax neutral and are therefore less likely to have significant effects on managers' portfolio wealth and human capital.

2.2 Statistical Tests

The statistical tests described below examine whether, subsequent to an accounting change, the relation between management compensation and reported earnings of a firm changes to fully offset the effect of the accounting change on reported earnings. The tests are based on the following compensation model, which is estimated for each of the firms in our sample.⁴

$$(1) \quad \ln(\text{COMP}_{it}) = \sum_{i=1}^n \alpha_i D_{it} + \beta \ln(\text{EARN}_t) + \varepsilon_{it}$$

where, COMP_{it} = salary and cash bonus paid to chief executive officer i during year t ,

EARN_t = accounting earnings for the firm during year t ,

D_t = 1 if individual i was CEO of the firm during the year t , and 0 otherwise,

n = the number of individuals who held the position of CEO of the firm during the sample period,

β, α_i = firm-specific parameters, to be estimated using time-series data on compensation and earnings, ($i=1, \dots, n$).

The model is estimated in a logarithmic form since there is some evidence that power transformations perform better than linear regressions in estimating relations between compensation and measures of performance (see Bayes and Schlagenhaut (1979)). In addition, prior studies have typically used log transformations (eg. Murphy (1985) and Abdel-khalik (1985)). Our results are therefore comparable to the findings of these studies. If earnings are negative, we assume their log value is zero. Twenty of the ninety companies in our sample (29 company-years) are adjusted in this way.⁵ The effect of this assumption is to limit managers to receive

earnings-dependent compensation only when their company earns profits, consistent with the option characteristics of most bonus contracts. (see Healy (1985)).

The intercept term in our model (or the fixed component of compensation) is allowed to vary across executives, reflecting differences in factors like age, ability and education among CEOs. The elasticity of compensation to earnings, β , is assumed to be firm-specific. Both compensation and earnings are measured in constant 1967 dollars to control for inflation.

The compensation variable used in our model is salary and bonus payments to the chief executive officers (CEOs) of our sample firms. This variable excludes several components of CEOs' compensation, such as performance awards that are contingent on earnings, and stock option awards, because disclosures of these awards are frequently incomplete. While this limits the conclusions of the study, it is worth noting that bonus and salary comprise a nontrivial proportion of executives' total remuneration. In Murphy's study of 461 executives from 1964 to 1981, salary and bonus is on average 80 percent of total remuneration.

To evaluate the impact of the accounting change on the compensation-earnings relation in equation (1), we define two earnings variables: reported earnings and "original" earnings. Reported earnings ($REARN_t$) are based on one set of accounting policies before the accounting change, and another after the change. Original earnings are computed using the original accounting policies (which are in effect before the change) and are denoted by $OEARN_t$. For periods prior to the accounting policy switch, $OEARN_t$ equals $REARN_t$; after the switch, $REARN_t$ is adjusted for the effect of the accounting change to obtain $OEARN_t$.

If management compensation is fully adjusted for the effects of changes in

accounting policies, the relevant accounting earnings variable in model (1) is $OEARN_t$, and the compensation model is:

$$(2) \quad \ln(\text{COMP}_{it}) = \sum_{i=1}^n \alpha_i D_{it} + \beta \ln(OEARN_t) + \epsilon_{it}$$

If, as the economic consequences theory hypothesizes, management compensation is not adjusted for accounting changes, the earnings variable in model (1) is $REARN_t$, and the model is:

$$(3) \quad \ln(\text{COMP}_{it}) = \sum_{i=1}^n \alpha_i D_{it} + \beta \ln(REARN_t) + \epsilon_{it}$$

We test the null hypothesis that compensation is based on earnings computed using the original set of accounting policies ($OEARN$). In equation (4), we include an additional variable $\ln(REARN_t/OEARN_t)$ to capture the effect of the accounting change on compensation. The model is thus estimated in the following form:

$$(4) \quad \ln(\text{COMP}_{it}) = \sum_{i=1}^n \alpha_i D_{it} + \beta \ln(OEARN_t) + \lambda \ln\left(\frac{REARN_t}{OEARN_t}\right) + \epsilon_{it}$$

The coefficient of the earnings adjustment variable, λ is zero if the "true" model is equation (2); λ is equal to β if the "true" model is equation (3). We use equation (4) to examine the following hypotheses:

- (i) There is no significant relation between accounting earnings and top management bonus and salary compensation ($H_0: \beta = 0$, $H_a: \beta > 0$).
- (ii) Top management salary and bonus compensation is fully adjusted for the effect of an accounting change on reported earnings ($H_0: \lambda = 0$, $H_a: \lambda > 0$).
- (iii) Top management salary and bonus compensation is adjusted for the effect of an accounting change on reported earnings ($H_0: \lambda = \beta$, $H_a: \lambda \neq \beta$).

Tests of hypothesis (iii) provides stronger evidence on the economic consequences theory than tests of hypothesis (ii), because hypothesis (ii) is rejected if the compensation committee partially adjusts compensation by changing the elasticity of compensation to earnings subsequent to the accounting change.

Equation (4) is estimated separately for each firm in the sample and the distribution of the estimated values of β and λ (and the associated t-statistics) are used to test the above hypotheses. The sign and significance of β , λ and $(\beta-\lambda)$ are tested by computing the following statistic for each variable:

$$Z = \frac{1}{\sqrt{n}} \sum_{j=1}^n \frac{t_j}{\sqrt{(k_j-2)/k_j}}$$

- where, t = t-statistic for firm j associated with the estimates of β , λ or $(\beta-\lambda)$ in equation (4),
 k_j = degrees of freedom in regression for firm j ,
 n = number of firms in the sample.

The t statistic for firm j is distributed Student t with variance of $k_j/(k_j-2)$. Under the Central Limit Theorem, the sum of the standardized t statistics is normally distributed with variance of n . Each Z-statistic is therefore a standard normal variate under the three null hypotheses discussed above.⁶ In addition to this parametric test, a nonparametric binomial test is used to test the hypotheses.^{7,8}

2.3 Sample Selection and Data Collection

The sample of inventory changes is selected from Accounting Trends and Techniques (1970 to 1976). We identify 161 companies that changed from FIFO to LIFO during this period. Our sample of depreciation changes is selected from Holthausen's database (see Holthausen (1981)). We exclude companies that changed to straight-line depreciation prior to 1967 since compensation data for these companies are incomplete. This restriction limits our sample to 80 of Holthausen's 139 companies.

Bonus and salary data and management changes are collected for the CFOs of our sample companies for the year of the accounting change and the ten years before and after that event from two sources: corporate proxy statements and the annual compensation survey published by Business Week. We require that (i) at least five years of consecutive compensation data are available before and after the year of the accounting change, and (ii) a minimum of fourteen consecutive years of data are available for each company. These data constraints reduce the samples to 52 companies that changed inventory policies and 38 companies that changed depreciation methods. The distribution of the changes over the sample period is reported in Table 1. The depreciation changes are clustered in 1968 and 1969, and the inventory changes in 1974 and 1975.

Earnings before extraordinary items are collected from COMPUSTAT for each company-year that has compensation data available. Compensation and corporate earnings data are deflated by the CPI to 1967 dollars. A summary of selected statistics is presented in Table 2. The median Salary + Bonus in 1967 constant dollars across all executive-years is \$186,000 for the inventory sample and \$190,000 for the depreciation sample. The median corporate earnings in 1967 dollars across all company-years is \$50,946,000 for the inventory sample and \$41,806,000 for the depreciation companies.

The earnings effects of the inventory and depreciation changes are collected from the financial statement footnotes for years following the change. Companies that use the LIFO inventory method report the current replacement value of inventory. This value approximates the FIFO inventory value and is used to calculate the difference between reported LIFO income and income that would have been reported had the company continued to use FIFO (original FIFO income). The effect of the depreciation switch from the accelerated to straight-line method is calculated from the deferred tax footnote. All the companies in our depreciation sample continue using the accelerated method for taxes following the reporting change to the straight-line method. The resulting timing difference between book and tax incomes gives rise to an adjustment to deferred taxes which is reported in the tax footnote. We use this value to calculate the difference between reported income and income that would have been reported had the company continued using the accelerated depreciation method.⁹

Table 3 reports statistics on the earnings effect of the change to LIFO as a percentage of earnings under FIFO. During the year of change, the median earnings reduction from the inventory policy change is 19.3%; the median reduction in earnings for all years after the change is 5.2%. The effect of the change in depreciation policy is also reported in Table 3. The median increase in earnings from the switch to straight-line depreciation is 6.6% percent in the year of the change. For years subsequent to this accounting change, the median earnings increase is 7.3 percent.¹⁰

3.0 RESULTS

3.1 Inventory Sample

Table 4 presents regression results for the sample of 52 firms that changed from FIFO to LIFO.¹¹ The average R^2 of the regressions is 0.65 indicating that accounting earnings explain a nontrivial proportion of the variability in CEO bonus and salary compensation.

The estimated coefficients on reported earnings are positive for 92 percent (48 of 52) of the sample firms. A binomial test indicates that there is a higher proportion of positive coefficients than expected by chance at the one percent significance level using a one-tailed test. The mean coefficient on reported earnings is 0.317 implying that a ten percent increase in earnings is associated with a 3.17 percent increase in bonus and salary compensation. The Z-statistic to test the joint significance of the earnings coefficients for the 52 sample companies is significant at the one percent level, enabling us to reject the null for hypothesis one, that there is no relation between accounting earnings and top management bonus and salary compensation.

The estimated coefficients for the earnings effect of the accounting change (the ratio of reported (LIFO) earnings and FIFO earnings) are positive for 71 percent (35 of 52) of the sample. A binomial test rejects the null hypothesis that the proportion of positive coefficients is equal to that expected by chance at the one percent level using a one-tailed test. The mean coefficient for the earnings adjustment term is 0.3613. The sample Z-statistic to test the collective significance of the λ s for all the 52 firms in the sample is significant at the one percent level. We therefore reject the null for hypothesis two, that top management's bonus and salary compensation is fully adjusted for the effect of the inventory change.

Descriptive statistics for the difference between the estimated

coefficients on as-if (FIFO) earnings and the earnings effect of the change to LIFO ($\beta-\lambda$) are also reported in Table 4. If the compensation committee uses reported earnings to reward CEOs and does not adjust earnings for the effect of the change to LIFO, the difference between these coefficients will be zero. The mean difference is -0.0443 and is not significantly different from zero at the five percent level using a two-tailed test. The differences in the estimated coefficients are positive for 48 percent (25 of 52) of the sample firms. A binomial test fails to reject the hypothesis that the proportion of positive differences in coefficients is equal to that expected by chance at the ten percent level. We thus reject the hypothesis that earnings-dependent compensation is adjusted for the effect of an inventory change to LIFO.

In summary, the results of the inventory tests support the economic consequences theory. The estimated coefficient on the earnings effect of the accounting change is positive and statistically significant, but is not statistically different from the as-if earnings coefficient. Compensation committees therefore appear to use reported earnings to determine executives' compensation subsequent to a change to LIFO and do not adjust earnings for the effect of the change in inventory method.

3.2 Depreciation Sample

The results for the 38 firms that changed from accelerated to straight-line depreciation are consistent with the results for the inventory sample presented above. Table 5 reports a summary of the ordinary least squares estimates of model (4). The average R^2 of the regressions is 0.69 and 84.2 percent (32 of 38) of the earnings coefficients are positive. A binomial test indicates that this number of positive estimates is

significantly greater than that expected by chance at the one percent level using a one-tailed test. The mean estimated coefficient is 0.1745 and is also statistically significant at the one percent level. Thus, as before, we find that there is a significant positive relation between reported earnings and CEOs' bonus and salary compensation.

The estimates of λ , the coefficient on the earnings adjustment variable, are also reported in Table 5. Recall that, if the compensation committee continues to use earnings based on accelerated depreciation after a change to straight-line depreciation, we expect λ to be zero. If the committee uses reported earnings, computed using straight-line depreciation subsequent to the accounting change, we expect λ to be positive. The estimates are positive for 60.5 percent (23 of 38) of the companies. Using a one-tailed test, the hypothesis that this percentage is the same as that expected by chance, is rejected at the five percent level. The mean earnings adjustment coefficient is 0.2752. The Z-statistic, which tests the hypothesis that the estimated value of λ is positive, is significant at the one percent level. We thus reject the hypothesis that earnings-dependent compensation is fully adjusted for the effect of the depreciation change.

The difference between the estimated coefficients on earnings computed using accelerated depreciation and the earnings effect of the accounting change is not statistically significant. The mean coefficient of -0.0753 is not significant at the ten percent level using a two-tailed test. The differences in the estimated coefficients are positive for 39.5 percent (15 of 38) of the sample firms. Using a two-tailed binomial test, we cannot reject the hypothesis that this percentage is the same as that expected by chance at the five percent level. As for the inventory sample, we reject the hypothesis that earnings-based compensation is adjusted for the effect of the accounting change.

In summary, our results for both inventory and depreciation samples indicate that there is a significant relationship between top executive compensation and reported earnings (hypothesis (i)). They are also consistent with the hypothesis that when the two accounting policies are changed, compensation committees do not fully adjust reported earnings for their effect. Finally, our tests support the hypothesis that there is no adjustment of salary and bonus compensation for the effect of an inventory or use reported earnings to depreciation change. In other words, compensation committees appear to compute earnings-based remuneration subsequent to changes from FIFO to LIFO and changes from accelerated to straight-line depreciation.

3.3 Tests of Changes in the Compensation Model's Parameters

Our model does not allow compensation committees to adjust the fixed component of compensation, or the elasticity of compensation to earnings to offset the effect of an accounting change. For example, committees might increase executives' fixed compensation (represented by α in our model) or increase the elasticity of compensation to earnings (represented by β) following a change to LIFO. Executives' remuneration would then still be a function of reported earnings, but the compensation effect of using LIFO earnings would be approximately offset by higher fixed rewards, or a higher bonus payout for a given percentage increase in earnings. We find that there is no significant difference between the coefficient on earnings based on the original accounting policies (β) and the coefficient on the earnings effect of the accounting changes (λ). Since this latter variable is non-zero in only the years following the accounting change, the result weakly supports our assumption that the elasticity of bonus and salary payments to earnings is constant throughout the estimation period.

To formally test stationarity of the models' coefficients, we estimate the following regression:

$$(5) \ln(\text{COMP}_{it}) = \sum_{i=1}^n \alpha_i D_{it} + \beta_1 \ln(\text{REARN}_t) + \beta_2 \text{DUM}_t + \beta_3 \text{DUM}_t \ln(\text{REARN}_t) + u_{it}$$

where, $\text{DUM}_t =$ one subsequent to the accounting change, and zero prior to the change.

Under the null hypothesis, that the fixed component of compensation and the elasticity of compensation to earnings are constant throughout the estimation period, both β_2 and β_3 are expected to be zero. A summary of the ordinary least squares estimates for the inventory and depreciation samples are reported in Table 6. We are unable to reject the null hypothesis that β_2 and β_3 are zero at the five percent level for the inventory sample. The estimated coefficients for β_2 and β_3 are positive for 52 percent and 46 percent of the sample firms respectively. The mean estimate of β_2 is 1.0552 with a Z-statistic of 1.3237, and the mean estimate of β_3 is -0.0691 with a Z-statistic of -1.1820. These results suggest that the compensation model's parameters do not change following a change from FIFO to LIFO. In particular, the compensation committee does not appear to increase the fixed component of executives' compensation or the bonus payout for each dollar of earnings to offset the earnings effect of the change to LIFO.

The results for the depreciation sample also support the hypothesis that the compensation committee does not adjust the compensation model parameters to offset the earnings effect of the accounting change*. A change from accelerated to straight-line depreciation generally increases reported earnings. If compensation committees allow for this change by reducing the fixed component of bonus and salary awards and/or the elasticity of

compensation to earnings, β_2 and β_3 in equation (5) will be negative. The mean estimate of β_3 is -0.1049 with a Z-statistic of -1.4759. We are unable to reject the null hypothesis that β_3 is zero at the five percent level. The mean estimate for β_2 is 1.3145 and we can reject the hypothesis that this estimate is significantly less than zero at the ninety-five percent level. This finding indicates that that fixed component of CEOs' bonus and salary compensation increases following the change to straight-line depreciation. However, it does not provide strong support for the view that compensation committees adjust CEOs' fixed remuneration to offset the effect of the accounting change, since we would then expect β_3 to be negative.

In summary, our findings suggest that compensation committees do not systematically offset the earnings effect of an accounting change on bonus and salary awards by adjusting the fixed component of remuneration or the elasticity of compensation to earnings.

3.4 Limitation of Our Results

There are several potential limitations of our findings:

1. Definition of Compensation. We only examine bonus and salary components of CEO compensation. Our study excludes stock-based remuneration. This form of compensation is particularly relevant to analysis of the inventory sample since a change to LIFO decreases taxes and thus is expected to increase equity prices and executives' portfolio wealth.

2. Cross-Sectional Dependence. Our statistical tests for pooling regression results across companies assume that the sample observations are independent. Since the inventory changes are clustered in 1974 and a majority of the depreciation changes occur in 1968 and 1969, this assumption may be violated. The reported significance levels are then overstated. To

investigate cross-sectional dependence, we estimate the cross-sectional correlations of the residuals from model (4) for 42 companies in the inventory sample with complete data available from 1966 to 1980. There are 861 pairwise residual correlation coefficients for these 42 companies. The mean correlation coefficient is only 0.0102, and is not significantly different from zero. There is therefore no strong evidence of cross-sectional dependence.

4.0 DISCUSSION OF RESULTS AND CONCLUSIONS

This paper investigates the effect of accounting policy changes on top management's compensation. We examine a sample of 52 firms that change from the FIFO to LIFO inventory method and 38 firms that change from accelerated depreciation to the straight-line method. These accounting changes differ in two dimensions. First, a change to LIFO is tax advantageous, whereas, a change to straight-line is tax neutral. Second, a change to LIFO typically decreases earnings, whereas a change to straight-line depreciation usually increases earnings. Nonetheless, the effects of these accounting policy changes in managerial compensation are consistent: remuneration appears to be based on reported earnings. This finding implies that CEOs' salary and bonus awards are reduced subsequent to the inventory policy change and increased following the depreciation switch.

Our findings differ sharply from one other paper that examines whether changes from FIFO to LIFO inventory methods are associated with changes in executives' remuneration. Abdel-khalik (1985) estimates cross-sectional regressions of bonus and salary compensation on earnings for a treatment sample of 88 companies that changed to LIFO in 1974, and a control sample of 88 companies that remained on FIFO in that year. He estimates differences in

the fixed component of compensation and the elasticity of compensation to reported earnings between these two samples in the two years prior to, the year of, and the year subsequent to the accounting change. In the two years prior to the inventory change the compensation parameters do not differ between the treatment and control groups. In the year of the change, the fixed component of compensation is higher for the control group and the elasticity of compensation to reported earnings is higher for the treatment group. These differences persist when reported earnings are replaced by as-if FIFO earnings for the treatment group. Abdel-khalik's findings are therefore mixed.

Our test design differs from that of Abdel-khalik in three ways⁴. First, we examine two accounting changes, one that typically increases earnings (a change to straight-line depreciation) and another that decreases earnings (a change to LIFO). Second, our tests examine earnings and compensation data for as many as ten years following an accounting change. Third, we use a time-series, rather than a cross-sectional, approach to estimate the relation between compensation and earnings. Murphy (1985) points out that studies that regress compensation on some index of performance across executives at a particular point in time are likely to be misspecified. For these regressions, "the exclusion of individual-specific factors, such as education and training, perceived ability, performance in previous jobs, firm size, etc... will lead to an omitted variables problem, reflecting factors that are fixed for an executive over time but vary across executives at a point in time." Correlations between the independent variables in a cross-sectional regression and these omitted variables will bias the estimated coefficients. There is some evidence that Abdel-khalik's findings suffer from this form of misspecification since when firm size is included in his cross-sectional

regressions, the fixed component of bonus and salary awards and the elasticity of compensation to earnings no longer differ between the treatment and control groups .

In summary, the findings of our paper indicate that compensation committees do not systematically adjust CEOs' bonus and salary awards for a change in accounting procedures . This result is generally consistent with the economic consequences hypothesis that it is costly to adjust compensation for an accounting change . If compensation committees and managers have rational expectations, the economic consequences hypothesis implies that committees write remuneration contracts anticipating management's incentives to opportunistically select accounting rules to increase their compensation . No adjustment to management's compensation schedules will then be observed following a change in accounting rules .

There are at least two costs of adjusting compensation for changes in accounting rules . First, there are costs of recomputing earnings under the original method in years subsequent to the change . These costs do not appear to be important for the accounting changes considered in this paper, since we are able to undo the effects of the change using publicly available information . A second cost, is the cost of distinguishing accounting changes selected by managers to increase their remuneration, from those selected to maximize the value of stockholders' wealth . If managers have inside information on future input prices, or investment opportunities, it would be costly for the compensation committee to determine whether FIFO or LIFO, or accelerated or straight-line depreciation methods maximize stockholders' wealth.¹²

Although our findings indicate that there are costs of adjusting bonus and salary compensation for the effects of changes in accounting policies, there

appear to be important forces that limit managers' incentives to select policies purely to increase their bonus and salary remuneration. For example, companies in our inventory sample change to the LIFO method despite the associated decline in their executives' bonus and salary awards.

Two factors are likely to offset this decline in earnings-based remuneration. First, managers own stock in the companies that employ them. Their portfolio wealth will therefore increase following a change to LIFO since equity prices will reflect the accompanying tax savings. Second, executive's human capital is likely to increase following a change to LIFO since the decision benefits shareholders. One area for future research is to compare these portfolio wealth and human capital effects for managers of companies that change to LIFO, and for managers of firms in the same industry that retain FIFO. If the tax advantages of using LIFO are similar for both samples of firms, portfolio wealth and human capital differences between executives could explain differences in their firm's accounting policy decisions.

FOOTNOTES

1. For a more detailed description of bonus plans see Healy (1985). For a description of performance plans see Smith and Watts (1982) and Larcker (1983).
2. A number of earlier studies that investigated the stock price reaction to accounting changes also focused on these two changes. They include Kaplan and Roll (1972) and Holthausen (1981) in the case of depreciation changes, and Sunder (1976), Biddle and Lindahl (1982) and Ricks (1982) in the case of inventory changes.
3. Changes from FIFO to LIFO decrease reported earnings if input prices are rising and physical inventory levels are not depleted. Changes from accelerated to straight-line depreciation increase reported earnings if nominal investments in new depreciable assets are increasing.
4. This model is similar to a model presented in Murphy (1985). However, Murphy uses abnormal stock performance as a proxy for management's performance, and constrains the slope coefficient (β) to be constant across firms.
5. We also estimate model (1) in linear form, allowing earnings to be negative, and constraining negative earnings to zero. Our conclusions are not sensitive to this adjustment to earnings, or to the logarithmic transformation.
6. For a detailed discussion of this test, see Christie (1982).
7. See Siegel (1956) for a description of the binomial test.
8. Both the tests discussed here are based on the sample distribution of the parameter estimates. In using these tests, it is assumed that the parameters are independent across the firms in the sample. Further discussion of this assumption is deferred to later in the paper.
9. Our depreciation sample includes six companies that changed to straight-line depreciation after 1970. For these companies the deferred tax items after 1981 reflect Accelerated Cost Recovery System (ACRS) rates. ACRS decreased the depreciable lives of fixed assets relative to previous accelerated methods, implying that subsequent to 1981 our adjustments for these companies are not strictly comparable to accelerated depreciation used for reporting purposes. However, this change affects at most three years data, and does not alter our conclusions.
10. None of the companies in our sample report the deferred tax effect for depreciation prior to 1971. Our as-if earnings series is therefore incomplete for companies that change to the straight-line method prior to this date.

11. Twenty-three of the 52 company regression residuals exhibit serial correlation. We use a Cochran-Orcutt transformation for these companies (see Theil (1971) for a description of this technique). The results do not change significantly. The results reported in Table 5 are therefore for the unadjusted estimates.
12. See Ball (1985) and Demski and Sappington (1985) for a discussion of selection of accounting procedures when managers have inside information on the costs and benefits of alternative accounting and production/investment decisions.

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Table 1

Distribution of Years of Accounting Changes for
 52 Companies Changing to the LIFO Inventory Method (1970-1976) and
 38 Companies Changing to the Straight-Line Depreciation Method (1967-1976)

Year of Accounting Change	Number of Companies Changing to LIFO	Number of Companies Changing to Straight-Line Depreciation
1967	-	2
1968	-	17
1969	-	12
1970	1	1
1971	1	3
1972	0	2
1973	0	0
1974	36	1
1975	10	-
1976	<u>4</u>	<u>-</u>
	<u>52</u>	<u>38</u>

Table 2

Selected Statistics for Executive-Years and Company Years for
 52 Companies Changing to the LIFO Inventory Method (1970-1976) and
 38 Companies Changing to the Straight-Line Depreciation Method (1967-1974).
 All Variables are in Thousands of CPI-Deflated (1967 = 100) Constant Dollars.

	Selected Statistics				
	Mean	Standard Deviation	First Quartile	Median	Third Quartile
<u>Executive Salary + Bonus</u>					
Inventory Sample	201	86	142	186	243
Depreciation Sample	191	64	138	190	232
<u>Corporate Earnings</u>					
Inventory Sample	117,000	229,000	24,654	50,946	98,370
Depreciation Sample	67,639	79,459	13,736	41,806	88,801

Table 3

Summary of the Relative Effect of Accounting Changes on As-If Earnings for
 52 Companies Changing to the LIFO Inventory Method (1970-1976) and
 38 Companies Changing to the Straight-Line Depreciation Method (1967-1976)

	Relative Earnings Effect	
	For Year of the Change	For 10 Years Following the Change
<u>Inventory Sample</u>		
Mean	-23.4%	-7.4%
First Quartile	-31.6	-9.5
Median	-19.3	-5.2
Third Quartile	-11.1	-1.9
Percent Positive	0.0	18.9
<u>Depreciation Sample</u>		
Mean	11.5%	12.2%
First Quartile	2.2	5.2
Median	6.6	7.3
Third Quartile	13.1	12.9
Percent Positive	100.0	89.7

Table 4

Summary of OLS Compensation Model Estimates for
52 Companies that Changed to the LIFO Inventory Method from 1970-1976.
Separate Intercepts are Estimated for Individual Executives.

$$\ln(\text{COMP}_{it}) = \sum_{i=1}^n \alpha_i D_{it} + \beta \ln(\text{OEARN}_t) + \lambda \ln\left(\frac{\text{REARN}_t}{\text{OEARN}_t}\right) + \varepsilon_{it}$$

Statistics	As-If Earnings Coefficient(β)	Accounting Change Effect Coefficient (λ)	Difference in Coefficients ($\beta - \lambda$)
Mean	0.3170	0.3613	0.0443
Z-Statistic	18.1227 ^a	5.8315 ^a	-1.3850
First Quartile	0.0664	-0.0443	-0.3312
Median	0.2397	0.2701	-0.0328
Third Quartile	0.5290	0.8111	0.2643
Percent Positive	92.31% ^a	71.15% ^a	48.08%
Mean R ²	0.6515		

^a Significant at the one percent level using a one-tailed test

COMP_{it} = salary + bonus for CEO i in year t ,

OEARN_t = original earnings in year t computed using the FIFO inventory method,

REARN_t = reported earnings in year t , computed using FIFO before, and LIFO after the accounting change,

D_{it} = one if individual i is CEO of the firm in year t and zero otherwise.

Table 5

Summary of OLS Compensation Model Estimates for
38 Companies that Changed to Straight-Line Depreciation from 1967-1976.
Separate Intercepts are Estimated for Individual Executives.

$$\ln(\text{COMP}_{it}) = \sum_{i=1}^n \alpha_i D_{it} + \beta \ln(\text{OEARN}_t) + \lambda \ln\left(\frac{\text{REARN}_t}{\text{OEARN}_t}\right) + \epsilon_{it}$$

Statistics	As-If Earnings Coefficient(β)	Accounting Change Effect Coefficient(λ)	Difference in Coefficients ($\beta - \lambda$)
Mean	0.1745	0.2752	-0.0753
Z-Statistic	15.7843 ^a	2.1595 ^a	-1.0382
First Quartile	0.0154	-0.6645	-1.4236
Median	0.1642	0.3234	-0.1632
Third Quartile	0.2640	0.7393	0.7493
Percent Positive	84.21% ^a	60.53% ^b	39.47%
Mean R^2	0.6932		

^a Significant at the one percent level using a one-tailed test.

^b Significant at the five percent level using a one-tailed test.

COMP_{it} = salary + bonus for CEO i in year t ,

OEARN_t = original earnings in year t computed using the accelerated depreciation method,

REARN_t = reported earnings in year t , computed using accelerated depreciation before, and straight-line depreciation after the accounting change,

D_{it} = one if individual i is CEO of the firm in year t and zero otherwise.

Table 6

Summary of OLS Estimated of Changes in Compensation Model
Intercepts and Slopes Following an Accounting Change for
52 Companies that Changed to the LIFO Method from 1970-1976 and
38 Companies that Changed to Straight-Line Depreciation from 1967-1976.
Separate Intercepts are Estimated for Individual Executives'.

$$\ln(\text{COMP}_{it}) = \sum_{i=1}^n \alpha_i D_{it} + \beta_1 \text{REARN}_t + \beta_2 \text{DUM}_t + \beta_3 \text{DUM}_t \ln(\text{REARN}_t) + \omega_{it}$$

Statistics	Earnings Coefficient (β_1)	Intercept Change Coefficient (β_2)	Slope Change Coefficient (β_3)
<u>Inventory Sample</u>			
Mean	0.38268	1.05520	-0.06914
Z-Statistic	13.66603 ^a	1.32366	-1.18199
First Quartile	0.17140	-2.07028	-0.48893
Median	0.29775	0.49882	-0.03559
Third Quartile	0.49860	4.28583	0.15996
Percent Positive	90.00% ^a	52.00%	46.00%
<u>Depreciation Sample</u>			
Mean	0.24244	1.31454	-0.10491
Z-Statistic	14.06769 ^a	2.17739 ^b	-1.47585
First Quartile	0.00843	-1.65457	-0.17795
Median	0.18216	0.59674	-0.04653
Third Quartile	0.48346	1.98318	0.14942
Percent Positive	76.60% ^a	59.57%	42.55%

^a Significant at the one percent level.

^b Significant at the five percent level.

COMP_{it} = salary + bonus for CEO i in year t ,

REARN_t = reported earnings in year t ,

D_{it} = one if individual i is CEO of the firm in year t and zero otherwise,

DUM_t = zero prior to the year of the accounting change and one thereafter.

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