DOUBLE COUNTING OF INFLATION:

AN EMPIRICAL TEST

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This study is concerned with potential measurement errors in FASB Statement No. 33 mandated earnings numbers. The methodology is a replication of a previous research with an emphasis on eliminating a particular kind of measurement error.

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TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

CHAPTER I

THE RESEARCH PROBLEM

Introduction

The purpose of this chapter is to present an overview of the inflation accounting problem, to introduce the managers' motive and ability to adjust the firm's reported historical cost earnings numbers to reflect anticipated inflation, to describe the purpose of the research, and to present a description of the organization of the remainder of the dissertation.

The Setting

Substantial normative research [e.g. Canning (1929), Sweeney (1936), Edwards and Bell (1961), Staubus (1961), Chambers (1966), Sterling (1970), Revsine (1973), etc.] concludes that inflation-adjusted accounting earnings should possess information content over and above that provided by historical cost earnings alone. The Financial Accounting Standards Board's (FASB) response to this research was the issuance of Statement No. 33 (SFAS No. 33), which was to be

effective over a five-year test period to permit the accounting profession to determine if the mandated inflation-adjusted earnings variables did indeed possess incremental information content over and above that provided by historical cost earnings variables alone.

Beaver and Landsman (BL, 1983) were commissioned by FASB to make such a determination and they conclude that not only do SFAS No. 33 earnings variables not possess incremental information content over historical cost earnings variables, but historical cost earnings variables do possess incremental information content over SFAS No. 33 earnings variables. Bublitz, Frecka, and McKeown (1985) examine this issue and find significant incremental explanatory power for specified sets of SFAS No. 33 earnings variables but their results are not consistent for a given variable from year to year. Kanaan, Linsmeier, and Lobo (1985) examine the issue in yet a different manner than BL or Bublitz, Frecka, and McKeown and find that SFAS No. 33 earnings numbers do have incremental information content over historical cost earnings numbers, but their results are sensitive to both the time period examined and the specific methodology used.

The results of these three studies are typical examples of the results published by many other researchers: either no incremental information content is found or the findings are sensitive to the specific variables and/or time periods examined and/or methodologies used. In almost every case

the authors note that measurement error, among other things, could be causing these problems. The purpose of this study is to determine the potential for one kind of measurement error (double counting of inflation) to cause the problems discussed above.

Double Counting of Inflation

Double counting of inflation is possible because the charge for depreciation expense varies inversely with the estimated life and, by selecting an appropriately shorter life, one can adjust the historical cost income to reflect any level of anticipated inflation. Then, when the historical cost earnings numbers are restated in compliance with SFAS No. 33, the inflation-adjusted earnings numbers contain two adjustments for the same inflation.

It is important to note that if double counting of inflation is present in FASB mandated inflation-adjusted earnings numbers, it is because the reported historical cost earnings numbers already contain an adjustment for anticipated inflation. The obvious corollary to this statement is: if an adjustment for anticipated inflation can be detected in the reported historical cost earnings numbers, then double counting of inflation must be present in the SFAS No. 33 earnings numbers. Area D in Appendix A illustrates this effect.

For the purposes of this study, the term adjusting is used to refer to the process of injecting an implicit adjustment for anticipated inflation into the reported historical cost earnings numbers by means of explicitly or implicitly varying the estimates of the lives of current period purchases of depreciable assets inversely with the anticipated inflation rate.

Technically, double counting of inflation as defined here is not precisely the same as double counting of inflation as used by BL. They refer to double counting of inflation as an inherent effect of using straight line depreciation as opposed to economic depreciation. (p. 28) The double counting effect occurs because straight line depreciation may implicitly assume a non-zero inflation rate, while real economic depreciation assumes a zero inflation rate. BL are silent about managers varying their estimates of the useful lives of depreciable assets inversely with anticipated inflation, or the effect this would have on the SFAS No. 33 earnings numbers.

The primary purpose of this research is to determine if SFAS No. 33 earnings numbers may be garbled because managers explicitly or implicitly vary the estimated useful lives of depreciable assets inversely with the anticipated inflation rate. This research consists of two stages. The first stage is designed to identify those firms which may be adjuster firms. The second stage is a replication of the BL research using only the nonadjuster firms.

Managers' Motive to Adjust

To establish that managers may be adjusting, it is necessary to establish that managers may have both an opportunity and a motive to adjust. Since adjusting merely involves systematic underestimation of the lives of depreciable assets, it is obvious that the management of any firm which purchases sufficient depreciable assets in any year will have an opportunity to adjust in that year.

That management may have a motive to adjust can be established as clearly as management's opportunity to adjust. For example, assume that managers wish to maximize their own long-run compensation and that the manager's compensation is based in part on the market price of the firm's stock (e.g. through a stock option plan). Also, assume that all publicly available information is reflected in the market price of a firm's stock (the semi-strong form of the Efficient Markets Hypothesis). Finally, assume that the market price of a firm's stock is an increasing function of the stockholder's expected return and a decreasing function of the risk associated with those expected returns (the Capital Asset Pricing Model). Under these assumptions, management's motive to adjust derives from the need to maintain the firm's capital at a level sufficient to sustain the firm's operations.

One of historical cost's major shortcomings is that in times of positive inflation, it fails to allow adequate

provisions for capital maintenance. Capital maintenance as used here refers to maintaining the firm's capital at a level sufficient to replace the firm's depreciable assets as they are used up or become worn out (i.e. a Replacement Cost approach). Edwards and Bell (1961) and Revsine (1973) provide classic discussions of replacement cost accounting. Hohl (1977) determines that, when a mix of assets is considered, a general price index applied to the entire mix of assets may surrogate for (approximate the results of) a series of specific price indexes applied to the specific assets and summed, thus, it may be that current replacement costs can be surrogated by general price-level adjustments.

Adequate provisions for capital maintenance (in terms of General Purchasing Power or Current Cost) may permit a reduction in the stock market's relative risk assessment for that firm, which may lead to an increase in the market price of the firm's stock and an increase in managerial compensation. An ongoing firm must replace its physical capital as it is used up or becomes obsolete. Under historical cost, the useful life of current period acquisitions is estimated by taking into account such factors as the rate of physical deterioration and obsolescence, but no provision is made for changing prices. In periods of inflation, less costly older assets are replaced by more costly new assets and the provision for depreciation on currently owned assets is not adequate to

allow for replacement of those assets at the end of their useful lives.

Inadequate provisions for depreciation leads to an overstatement of net income, and a dividend policy based on overstated net income will result in excessive dividends. In effect, part of the dividends represent a return of capital instead of a return on capital. This return of capital to the firm's stockholders must be replaced by issuing new equity and/or debt securities when the firm's depreciable assets require replacement. Adequate provisions for depreciation would mitigate the overstatement of net income and the associated excessive dividends and avoid the expense and risks of issuing new equity and/or debt securities.

SFAS No. 33 (1979) provides some evidence related to adjusting:

> There is a presumption that depreciation methods, estimates of useful lives, and salvage values of assets should be the same for purposes of current cost, historical cost/constant dollar, and historical cost/nominal dollar depreciation calculations. However, if the methods and estimates used for calculations in the primary financial statements have been chosen partly to allow for expected price changes, different methods and estimates may be used for purposes of current cost and historical cost/constant dollar calculations. (Paragraph 61)

Other evidence of adjusting is found in the way firms responded to Paragraph 61 of SFAS No. 33. An Arthur Young survey (1981) finds twelve of the three hundred firms in their sample disclose the use of different depreciation

methods or depreciable lives in compliance with Paragraph 61. Only three of the twelve firms are actually named and discussed in the survey but one of those firms does admit to using shortened asset lives in its primary financial statements.

Another thread of evidence toward adjusting is of the deductive type. For example, the fact that many firms have fully depreciated assets in use provides evidence that shortened lives perhaps are being used.

To summarize the above discussion, three points are made:

1. Management has the opportunity to adjust,
2. Management has a motive to adjust, and
3. The primary effect of adjusting (shortened asset lives) is present for many firms.

Summary

FASB has repealed the mandatory aspects of SFAS No. 33. In effect, FASB has placed inflation accounting on a 'back burner'. This consideration was presumably based in part on published information content studies, some of which are discussed in this paper and all of which are potentially biased against the SFAS No. 33 variables due to measurement error. Double counting of inflation is one type of measurement error which could bias research against finding incremental information content in SFAS No. 33 variables, and therein lies its significance.

Double counting of inflation is one of several potential sources of measurement error which could cause SFAS No. 33 earnings numbers to appear to be a mere garbling of reported historical cost earnings numbers. The double counting effect is caused by managers varying their estimates of the useful lives of current period acquisitions inversely with anticipated inflation. This result may inject an implicit inflation adjustment into the reported historical cost earnings numbers.

Organization of Remaining Chapters

Chapter II provides a review of the relevant accounting information content research studies. Chapter III discusses the methodology employed in this study. Chapter IV describes the results of the first stage of the research. Chapter V provides an analysis of the results of the second stage of the research. Chapter VI contains a summary and conclusions of the study and discusses some limitations and possibilities for further research.

CHAPTER II

LITERATURE REVIEW

Introduction

This literature review will begin with a brief summary of information content theory as it applies to accounting. Studies related to the information content of reported historical cost and inflation-adjusted earnings numbers are discussed. After a brief discussion of inflation, the topic turns to SFAS No. 33. Several empirical studies related to SFAS No. 33 are presented.

Information Content of Historical Cost

If reported accounting earnings numbers provide information to investors the market price of a firm's stock should reflect this. Under the semi-strong form of the efficient markets hypothesis, the current market price would reflect the market's expectation of future accounting earnings; thus, only the unexpected portion of changes in accounting earnings should cause changes in the market price of a firm's securities and advance knowledge of unexpected

accounting earnings would allow an investor to earn an abnormal (or unexpected) return on his investment.

Ball and Brown (1968) predict a positive correlation between unexpected changes in earnings and abnormal returns. They estimate unexpected changes in reported annual earnings to be the residuals of a time series regression of actual changes in reported annual earnings. They then combine firms into 'good' news (unexpected increase in reported earnings) and 'bad' news (unexpected decrease in reported earnings) portfolios. The authors use a time series of actual market returns to predict a 'normal' return and estimate abnormal returns to be the difference between actual returns and normal returns.

Ball and Brown expect the good news portfolio to earn a positive abnormal return and the bad news portfolio to earn a negative abnormal return, and this is exactly what they find. The implication of these findings is that while much of the price adjustment to annual earnings changes occurs before the release of the earnings announcement: given the semi-strong form of the efficient markets hypothesis, reported accounting earnings do reflect factors which affect stock market prices and are potentially informative.

Brown and Kennelly (1972) extend the Ball and Brown (1968) research to quarterly earnings and report the following two conclusions:

aggregate abnormal rates of return on the securities to which the EPS numbers relate.
2. Disaggregation of annual EPS into its quarterly components improves the predictive ability of the EPS series by at least 30-40 percent. (p. 415)

Information Content of Current Cost and Constant Dollar

Abdel-Khalik and McKeown (1978) evaluate the impact of Value-Line estimates of Replacement Cost (RC) income on the market's evaluation of systematic risk. They use Edwards and Bell's (1961) theoretical framework to conclude that RC information should impact on market prices.

Abdel-Khalik and McKeown separate risk into operating (OR) versus financial and attempt to structure relationships between:

1. OR and RC income,
2. Capital maintenance and systematic risk (considered cases where dividends were greater than or less than RC income), and
3. The association between levels of holding gain/net income and the market price.

The authors conclude that if the market impounds RC information before its publication, their tests do not reveal it. In short, unambiguous inferences about the information content of Value-Line estimates of Replacement Cost income cannot be drawn.

Estes (1968) reports the results of a questionnaire survey, the purpose of which is to determine the expected usefulness to external users of information regarding current

value and general price-level effects in addition to the traditional historical cost numbers. He assumes implicitly that the interests of current and potential investors and lenders closely parallel the interests of the members of three organizations:

1. The Institute of Chartered Financial Analysts,
2. The National Association of Bank Officers and Credit Men (Robert Morris Associates), and
3. The Financial Executives Institute.

The author concludes that the three groups surveyed apparently think that price-level information would be of some value (if in addition to historical cost information) but that current value information would be more valuable than price-level information.

Brenner (1970) presents the results of another questionnaire survey, the purpose of which is to determine users' expected value (if any) of current cost information as a substitute for historical cost information. The three groups surveyed by this author are (1) stockholders, as obtained from a nationwide mailing list company, (2) bankers, as obtained from the roster of the American Bankers Association, and (3) Financial Analysts, as obtained from the roster of the Institute of Chartered Financial Analysts.

The major conclusion of this paper is that stockholders often have desires inconsistent with those of bankers and financial analysts. The basic result of the research is that financial analysts would often prefer current cost

information over historical cost information, but the result is neither strong nor consistent.

Inflation: Anticipated and Unanticipated

Various studies use different methods of estimating anticipated inflation. Fama and Gibbons (1982) use several methods of estimating anticipated inflation for January 1978 through June 1981. Past inflation rates, interest rates on Treasury bills, monthly estimates of inflation by experts, and the GNP deflator are all used and the resulting estimates of anticipated inflation are highly correlated. The implication is that research results should not be highly sensitive to the method used to estimate anticipated inflation. A possible conclusion is that the major portion of actual inflation is anticipated and, if the inflation is anticipated Current Cost disclosures should also be easily anticipated once Historical Cost earnings are known.

SFAS No. 33

The Beaver and Landsman (1983) research report has had a significant effect on inflation accounting. Commissioned to do the research by FASB, the authors examined almost every aspect of SFAS No. 33 disclosures. The major empirical findings are:

(1) once historical cost earnings are known, the Statement 33 earnings variables provide no additional explanatory power with respect to differences across firms in yearly stock price changes,
(2) Even after any one of the Statement 33 earnings variables is known, knowledge of historical cost earnings still provides additional explanatory power. In this sense, historical cost earnings strictly dominate the Statement 33 earnings variables. The finding is consistent with FASB Statement 33 variables' being a garbling of historical cost earnings. (p. 10)

Consistent with the supplemental nature of SFAS No. 33 disclosures, the main thrust of this analysis is to ask whether SFAS No. 33 variables can provide information in addition to (rather than instead of) historical cost earnings numbers. The authors extend their initial research design to examine the ability of SFAS No. 33 variables to explain differences in the level of stock prices across firms rather than the change in stock price over time. Historical cost earnings explain the major portion of the differences across firms. The authors also examine the incremental information content of historical cost earnings variables over that of SFAS No. 33 data and find that once SFAS No. 33 earnings are known, historical cost earnings variables still provide consistently significant additional explanatory power with respect to differences across firms in yearly stock price changes.

Beaver and Landsman conclude that although the failure to find incremental explanatory power could be due to some defect in the research design, this is not likely because the basic finding is upheld under several extensions of the

research design. The authors discuss the possibility of measurement error and what could be done to reduce measurement error if it is present.

Bublitz, Frecka and McKeown (1985) reexamine the issue of whether or not current cost disclosures add explanatory power to models containing historical cost earnings variables. They use cross-sectional regressions for 1980 through 1983 and find significant incremental explanatory power for specified sets of SFAS No. 33 earnings variables. The authors note that the results are not consistent for a given variable from year to year.

Bublitz, Frecka and McKeown discuss a rather wide variety of methodological and econometric issues and conclude that the BL results of no incremental explanatory power may be obtained because BL examines only a limited number of earnings variables that are highly correlated with historical cost earnings and each other, and because their tests are "too demanding." Bublitz, Frecka and McKeown replicate the BL study and find that, with few exceptions, the same results as BL are obtained when they use the same methodology as BL. Bublitz, Frecka and McKeown then explore different approaches designed to determine the sensitivity of the results to alternative forms of the independent and dependent variables, and treatment of extreme observations. Bublitz, Frecka and McKeown find that regardless of the form of the dependent variable, an historical cost variable always has the highest correlation with the market, and note that their evidence may

be weak because it is based on analysis of increases in the explanatory power of regressions rather than analyses of regression coefficients.

Kanaan, Linsmeier, and Lobo (1985) attack the information content of SFAS No. 33 data in yet a different manner than BL (1983) or Bublitz, Frecka and McKeown (1985). These authors measure annual returns from April 1 to March 31, exclude utilities, and include a specific estimate of systematic risk in their model in the same fashion as BFM, but these authors also:

(1) examine the incremental information content of individual SFAS No. 33 CC and CD measures rather than assessing the combined information content of several SFAS No. 33 measures,
(2) exclude firms that did not report CC and CD data exclusive of an adjustment to lower recoverable amounts, and
(3) define the CC earnings variable in nominal rather than constant dollars. The significance of each of these modifications is tested and no modification is found to significantly alter the conclusions.

Kanaan, Linsmeier and Lobo find that, when considered alone, every income measure has information content in each of the years examined, and both CC and CD income have incremental information content over HC income, but HC income does not have incremental information content over CC income or CD income. The authors also find that only CC income has incremental information content over both the other measures.

As a result, Kanaan, Linsmeier and Lobo conclude that CC disclosures are the most relevant measure of inflation's effect on accounting numbers and, therefore, are the only

inflationary disclosures that need be disclosed in the future. The authors also conclude that further research is needed to assess the robustness of SFAS No. 33 data as compared to historical cost data.

Olsen (1985) examines the association between SFAS No. 33 disclosures and the equity security prices of electric utilities. Since electric utilities are regulated in this country and the rates that utilities are allowed to charge is usually based on historical cost equity, no information content for SFAS No. 33 disclosures is expected and none is found by this study. The author notes that BL focus their research on a broad sample of firms rather than one specific industry and state that the BL findings of no information content for SFAS No. 33 disclosures may be due to considerable heterogeneity in the samples examined.

Olsen describes the disclosure requirements of SFAS No. 33 and details the differences between the mandated disclosures and the electric utilities actual disclosures. Olsen then presents an equity valuation model and discusses some issues associated with the use of that model. Olsen concludes that the results of his research are consistent with historical cost accounting numbers having a consistently significant association with equity security prices in the years examined and SFAS No. 33 disclosures not providing consistently significant incremental information content.

Summary

This chapter provides a discussion of accounting information content theory and discusses several typical empirical studies related to SFAS No. 33. The results of those studies which are discussed are typical (i.e. inconsistent and inconclusive) of the results of most other studies of SFAS No. 33 earnings variables. The purpose of the current study is to determine the potential for one kind of measurement error (double counting of inflation) to cause the problems discussed above. This purpose is accomplished in two stages: 1) by determining which firms are likely to be presenting garbled SFAS No. 33 earnings numbers and 2) comparing a replication of the BL research with a second replication in which those firms are eliminated. The next chapter presents the two basic hypotheses and discusses the methodology used in the two stages of this research.

CHAPTER III

METHODOLOGY

Introduction

The purpose of this chapter is to present the two basic hypotheses of this research and the methodology which is used to test them. The first hypothesis is that some firms may be adjuster firms and the first stage of this research uses a regression to detect these firms. The second hypothesis is that the BL research results may be biased against finding incremental informational content for the SFAS No. 33 earnings variables due to the presence of adjuster firms. A replication of the BL research is designed and used to test the second hypothesis.

Statement of the Hypotheses

The first hypothesis of this study is that some managers may be varying their estimates of the useful lives of current period acquisitions inversely with anticipated inflation. If this hypothesis is true, adjuster firms will report historical cost earnings numbers in their primary

financial statements, which are adjusted partially for inflation. The historical cost earnings numbers will preempt some of the information content of the SFAS No. 33 earnings numbers (Area D in Appendix A). If indexing without reestimating those lives is used to prepare the SFAS No. 33 earnings numbers, double-counting of inflation will result (Area E in Appendix A). If a research sample contains any adjuster firms, any attempt to determine the relative information content of reported historical cost versus SFAS No. 33 earnings numbers will be biased against the SFAS No. 33 earnings numbers. As the proportion of adjuster to nonadjuster firms in the sample increases, the bias against the SFAS No. 33 earnings numbers also increases.

Another hypothesis of this study is that the bias against finding incremental information content for SFAS No. 33 earnings numbers may be sufficient to cause the BL finding of no incremental information content for SFAS No. 33 earnings numbers. If the sample of firms used by BL includes any adjuster firms, their research results may be biased against finding information content. SFAS No. 33 earnings numbers <u>may</u> or <u>may not</u> contain incremental information content over and above that contained by historical cost earnings numbers. However, if the sample of firms used by BL includes a large enough proportion of adjuster firms, their research may not be able to detect such information content even if it is present.

Inflation: Anticipated and Unanticipated

Various studies use different methods of estimating anticipated inflation. The Fama and Gibbons (1982) examination of several methods of estimating anticipated inflation implies that research results should not be highly sensitive to the method used to estimate anticipated inflation. One of the methods of estimating anticipated inflation examined by Fama and Gibbons is the naive model where the last year's actual amount is used as the estimate of the current amount. A naive model for anticipated inflation is used in this research where actual inflation is assumed to be the last year's percentage change in the Consumer Price Index.

Testing of the Hypotheses

To test the first hypothesis, the estimated useful life of current period acquisitions for each firm (L_t) is regressed on anticipated inflation (Regression 1). A negative and significant slope coefficient (less than -2.0) indicates an adjuster firm. A naive model for anticipated inflation is used in this regression as the independent variable (AI_t). The dependent variable (L_t) is estimated by dividing the cost of current period acquisitions (GPA_t) by an estimate of one full year's depreciation expense taken on those acquisitions (DEA_t). DEA_t is estimated by solving the

firm's depreciation equation for DEA_t. The firm's depreciation equation is developed and discussed in Appendix B.

To test the second hypothesis, the BL research is replicated. The replication consists of:

1) applying the BL methodology to a sample of firms,
2) omitting the adjuster firms from that sample,
3) applying the BL methodology again to the remaining nonadjuster firms, and
4) comparing the results obtained using the full sample with the results obtained using the partitioned, nonadjuster sample.

Due to the adjuster firm bias in the full sample, the partitioned nonadjuster sample results should be more meaningful than the full sample results. If there is significant incremental information content in SFAS No. 33 earnings numbers, then the Beaver and Landsman methodology applied to the partitioned nonadjuster sample will be better able to detect it than the same methodology applied to the full sample.

Detecting Adjuster Firms

Assume that a firm replaces roughly the same mix of assets each year and that the assets of the firm have no salvage value. If such a firm is not adjusting (a nonadjuster firm), that firm will estimate the same useful life for each of the current acquisitions in successive

years. Thus, the average useful life of all current period acquisitions will be a constant over time. The nonadjuster firm will have the same average useful life for assets: 1) acquired in the current period, 2) retained from previous periods, and 3) disposed of or fully depreciated in the current period. Since for straight line depreciation and no salvage value the estimated useful life (L) is simply the cost of the asset (GPA) divided by the depreciation expense taken on that asset (DEA), for a nonadjuster firm the following equality will hold:

$$L = (GPA_t/DEA_t) = (GPA_{t-1}/DEA_{t-1}) = (GP/DE) \qquad \text{Equation 1.}$$

Equation 1 simply states that a nonadjuster firm estimates the same average useful life for its mix of current period acquisitions as it has estimated the past.

Assume again that a firm replaces roughly the same mix of assets each year and that the assets of the firm have no salvage value. If the management of such a firm is adjusting (an adjuster firm), management will vary the estimated useful life of each (or some) of the current acquisitions inversely with anticipated inflation; thus, the average useful life of an adjuster firm's current period acquisitions (L_t) will vary inversely with the firm management's anticipated inflation (AI_t). For an adjuster firm, a negative and significant slope coefficient (b_2) is expected for Regression 1:

$$L_t = a_1 + b_2 AI_t + e_t \qquad \text{Regression 1.}$$

For a nonadjuster firm, a slope coefficient of zero is expected in Regression 1.

In Regression 1 the intercept term (a_1) is interpreted as the average useful life that would have been used had there been no adjustment for anticipated inflation. The combined term $(b_2)*(AI_t)$ then measures the extent of adjustment of life for anticipated inflation, which will be zero for a nonadjuster firm or some negative value for an adjuster firm.

In summary the first stage of this research (detecting adjuster firms) consists of the following steps:

1. A sample of firms is selected that is as similar as possible to that of BL by following their published sample selection criteria.
2. The Compustat tapes are accessed and 25 years (1960-1984) of data are obtained for each firm.
3. The DED_t series is estimated for each firm.
4. Each firm's depreciation convention is estimated as illustrated in Appendix B using only the first ten years (1960-1969) of data.
5. The DEA_t series (1970-1984) for each firm is estimated. The estimates of DED_t and M developed in steps 3 and 4 above are used in this step.
6. For each firm, the dependent variable (L_t) in Regression 1 is estimated by dividing the cost of current period acquisitions by the estimate of DEA_t.
7. The independent variable (AI_t) in Regression 1 is estimated by using a naive model for anticipated inflation.
8. For each firm, Regression 1 is performed and t-scores are obtained for the slope coefficient. Any firm with a t-score less than or equal to negative two (-2.0) is considered an adjuster firm and any firm with a t-score greater than negative two (-2.0) is considered a nonadjuster firm.

The Beaver and Landsman Replication

The second hypothesis is tested by replicating the BL research using only the nonadjuster firms. Adjuster firms report SFAS No. 33 earnings variables that contain double counting of inflation and this would cause the BL research results to be biased against finding incremental information content for SFAS No. 33 earnings variables.

BL use a cross-sectional, two-stage regression approach with a sample size of 731 firms. All data are derived from the Compustat tapes and separate analyses are performed for each of three years (1979-81). In the first-stage regressions, each of seven other earnings variables, generically denoted X_{it} (See Appendix C), is regressed on the historical cost earnings variable (HC_{it}) to obtain residuals (Z_{it}) which are uncorrelated with the historical cost earnings variable.

$$X_{it} = a_t + b_t HC_{it} + Z_{it} \qquad \text{Regression 2.}$$

In the second-stage regressions, a security return variable ($RETURN_{it}$,) is regressed on the historical cost earnings variable and the residuals from the first-stage regressions.

$$RETURN_{it} = a_t + b_{1t} HC_{it} + b_{2t} Z_{it} + U_{it} \qquad \text{Regression 3.}$$

An analysis of the regression coefficients of Regression 3 led directly to the BL conclusion of no significant incremental information content for SFAS No. 33 earnings variables. In summary, the second hypothesis is tested by following the following steps:

1. The BL research is replicated by performing Regressions 2 and 3 using the entire sample of firms. The results of this replication are similar to that of BL, which provides some evidence that the full replication sample of 356 firms may be similar to the 731 firm sample used by BL. This result indicates that the conclusions drawn by examining the full replication sample might appropriately be extended to the BL research.
2. The BL research is replicated by performing Regressions 2 and 3 using only the nonadjuster firms. The results of this replication should be less biased (and thus, more meaningful) than the results obtained by using the full sample. By comparing the results of these two replications an indication is obtained as to just how serious the adjuster firm bias is.

Summary

In this study, a sample as similar as possible to that used by BL is obtained and a regression is performed to determine which firms are adjuster firms (i.e. injecting an implicit adjustment for anticipated inflation into the reported historical cost earnings numbers by means of explicitly or implicitly varying the estimates of the lives of current period purchases of depreciable assets inversely with the anticipated inflation rate). Then the BL research

is replicated twice, once with the full sample of firms which contain some adjuster firms and again after the adjuster firms are eliminated. By comparing the results of the two replications, an indication is obtained as to just how serious the measurement error in the BL research may be. The next chapter presents the results of the first stage of this research and the following chapter presents the results of the second stage of this research.

CHAPTER IV

RESULTS OF STAGE ONE (HYPOTHESIS ONE): IDENTIFICATION OF ADJUSTER FIRMS

In this chapter, the results of Stage One of the research are provided. First, the sample selection process is discussed and a comparison of the BL sample with the full replication sample is made to provide some assurance that the full replication sample is as similar as possible to the BL sample. Then, the results of the adjuster regression are presented.

Sample Selection and Comparison

This section compares the full replication's sample characteristics with the published BL sample characteristics. In each of the tables referred to below, the published BL sample characteristics are reproduced in the first column under the heading "BL" and the characteristics of the full replication sample are presented in the second column under the heading "BL Rep". The reconciliation of sample size and industry composition is

discussed first. Then summary statistics of and correlations among security returns and the various earnings variables are presented and discussed.

Table I duplicates BL Table 10 and reports the further reduction in sample size (from 731 to 356 firms) due to lack of sufficient data on the Compustat tapes to perform the adjuster firm-detecting regression. There are 1137 firms on the SFAS No. 33 nonfinancial file and 346 of those firms are eliminated by BL for having a fiscal year-end other than December 31, leaving 791 firms with fiscal year-ends on December 31. Of these 791 firms, 59 are not on the Compustat files and one company (Barber Oil) is deleted because of limited SFAS No. 33 data due to liquidation, leaving BL with a final sample size of 731 firms.

Of the 731 firms in the BL sample 375 have insufficient data on the Compustat tapes to perform the adjuster regression, leaving a full replication sample size of 356 firms. It is not surprising that less than half of the BL sample have sufficient data to perform the adjuster regression because the amount of data required for the adjuster regression is much greater than that required for the BL research. Where the BL research requires only four years (1978-1981) of data on the Compustat tapes, the adjuster regression requires at least 25 years of data.

Table II duplicates BL Table 11 and compares the BL sample and the full replication sample by industry composition. The BL sample has a smaller percentage of

TABLE I

RECONCILIATION OF SAMPLE SIZE

BL*

Number of companies on Statement 33 nonfinancial file	1137
Number of companies with fiscal years other than December 31	346
Number of December 31 fiscal year-end companies	791
Number of companies not on Compustat files	59
Number of 12/31 companies on Compustat	732
Company deleted because of limited Statement 33 data due to liquidation*	1
Final BL sample size	731

*firm deleted is Barber Oil (CUSIP No. 67149)

BL Rep

Number of companies in BL sample	731
Number of companies with insufficient data to perform the adjuster regression	375
Number of companies in BL full replication	356

Table shows reconciliation of the Beaver-Landsman sample size (731 firms) with the Full Replication Sample (356 firms).

* Source: Beaver, W., and W. Landsman. Incremental Information Content of Statement 33 Disclosures. Financial Accounting Standards Board, 1983.

chemicals companies (7.5 percent) than the full replication sample (12.6 percent). The next largest change in industry representation is 3.4 percent for both the machinery and the transportation and communication industries. The machinery

TABLE II

INDUSTRY COMPOSITION

Industry	BL* No. of Firms	BL* Percent	BL Rep No. of Firms	BL Rep Percent
Chemicals	55	7.5	45	12.6
Financial insurance	16	2.2	2	0.6
Food, tobacco, and textiles	43	5.9	19	5.3
Lumber, paper, and allied products	31	4.2	15	4.2
Machinery	72	9.8	47	13.2
Mining and construction	54	7.4	18	5.0
Other nonmanufacturing	33	4.5	5	1.4
Other manufacturing	59	8.1	33	9.3
Petroleum and rubber	46	6.3	20	5.6
Primary and fabricated metals	52	7.1	32	9.0
Transportation and communication	68	9.3	21	5.9
Transportation equipment	29	4.0	17	4.8
Utilities	138	18.9	65	18.3
Wholesale and retail trades	35	4.8	17	4.8
Total	731	100.0	356	100.0

Table compares industry composition of the BL sample with that of the Full Replication Sample.

* Source: Beaver, W., and W. Landsman. Incremental Information Content of Statement 33 Disclosures. Financial Accounting Standards Board, 1983.

industry's representation increases from 9.8 percent in the BL sample to 13.2 percent in the full replication sample. The transportation and communication industry's representation decreases from 9.3 percent in the BL sample to 5.9 percent in the full replication sample. The

financial insurance and other nonmanufacturing industry groups are nearly excluded from the full replication sample but neither of these comprise more than 5 percent of the BL sample.

Table III duplicates BL Table 14 and compares the BL sample and the full replication sample by summary statistics for return and the other earnings variables. Most of the means (and standard deviations) of the variables are lower for the full replication sample than for the BL sample. This result is an indication that the firms in the full replication sample reported generally lower earnings numbers than the firms in the BL sample; thus the 375 firms which are eliminated from the BL sample reported generally higher earnings numbers than the 356 firms in the full replication sample.

Table IV duplicates BL Table 15 and compares the BL sample and the full replication sample by selected correlations among the earnings variables. Most of the correlations between HC and the other earnings variables are higher for the full replication sample than for the BL sample, the exceptions being POST in all three years and POSTP in 1981. The largest consistent difference is that between HC and CF (at least .19 in all three years), but CF is not one of the SFAS No. 33 earnings variables. The fact that the correlation between POST and POSTP in 1979 is .79 in the BL sample and only .04 for the full replication

TABLE III

SUMMARY STATISTICS FOR RETURN AND EARNINGS VARIABLES

	BL*		BL Rep	
	MEAN	STD. DEV.	MEAN	STD. DEV.
1979				
# observations	392		266	
RETURN	.29	.39	.16	.35
HC	.19	.55	.16	.52
CF	.12	.28	.11	.26
POST	.25	.17	.25	.16
POSTP	.20	.16	.06	.08
1980				
# observations	323		211	
RETURN	.31	.37	.14	.38
HC	.01	.31	-.06	.27
CF	.03	.24	-.009	.21
PRE	-.24	.62	-.29	.59
CD	-.23	.61	-.26	.56
PREP	-.16	.33	-.20	.33
CDP	-.16	.33	-.20	.32
POST	.17	.08	.17	.06
POSTP	.16	.12	.06	.06
1981				
# observations	297		206	
RETURN	.01	.27	-.11	.28
HC	.04	.36	-.07	.32
CF	.06	.29	-.03	.26
PRE	-.04	.71	-.17	.56
CD	-.10	.62	-.19	.57
PREP	-.10	.43	-.18	.40
CDP	-.13	.42	-.21	.38
POST	.15	.09	.14	.08
POSTP	.08	.09	.07	.10

The variables in this table and the tables that follow are as defined and discussed by BL (1983) on pages 49-52. For convenience, these definitions (without the discussion by BL) are reproduced in Appendix C.

* Source: Beaver, W., and W. Landsman. Incremental Information Content of Statement 33 Disclosures. Financial Accounting Standards Board, 1983.

TABLE IV

SELECTED CORRELATIONS AMONG THE EARNINGS VARIABLES

	BL*	BL Rep
1979		
# observations	392	266
HC vs. CF	.60	.89
HC vs. POST	.07	.03
HC vs. POSTP	.24	.29
POSTP vs. POST	.79	.04
1980		
# observations	323	211
HC vs. CF	.75	.94
HC vs. PRE	.71	.77
HC vs. CD	.69	.75
HC vs. PREP	.73	.81
HC vs. CDP	.73	.81
HC vs. POST	.33	.27
HC vs. POSTP	.30	.33
PRE vs. PREP	.82	.86
PRE vs. CD	.73	.77
POSTP vs. POST	.93	.86
CD vs. CDP	.85	.86
1981		
# observations	297	206
HC vs. CF	.72	.96
HC vs. PRE	.70	.72
HC vs. CD	.63	.67
HC vs. PREP	.71	.75
HC vs. CDP	.64	.75
HC vs. POST	.22	.15
HC vs. POSTP	.22	.10
PRE vs. PREP	.84	.85
PRE vs. CD	.69	.72
POSTP vs. POST	.82	.84
CD vs. CDP	.87	.82

See Appendix C for definitions of variables.

* Source: Beaver, W., and W. Landsman. Incremental Information Content of Statement 33 Disclosures. Financial Accounting Standards Board, 1983.

sample should probably be considered an anomaly, since the difference does not repeat in either 1980 or 1981.

Table V duplicates BL Table 16 and compares the BL sample and the full replication sample by correlation between security returns and the other earnings variables. The correlation between security returns and the other earnings variables are generally higher (in absolute terms) for the full replication sample than for the BL sample.

The full replication sample differs from the BL sample in size, earnings and various correlations. One other difference which should be noted is that the full replication sample consists of generally older firms. Since 25 years of data are required for the adjuster regression, any firm which has been in existence less than 25 years is eliminated. The difference in size would not be a problem if it were not for the possibility that the firms which are eliminated shared some characteristic which could affect the results of this research. The full replication sample firms have lower earnings and higher correlations than the BL sample, and this result implies that the firms which are eliminated have generally higher earnings and lower correlations than the firms in the full replication sample.

Since actual inflation was decreasing during the period of this study (1979-81) it is reasonable to assume that anticipated inflation was decreasing also. In times of decreasing anticipated inflation an adjuster firm will lengthen the estimated lives of its current period

TABLE V

CORRELATION BETWEEN SECURITY RETURNS AND EARNINGS VARIABLES

	BL*	BL Rep
1979		
# observations	392	266
HC	.47	.43
CF	.49	.51
POST	-.03	-.11
POSTP	.24	.39
1980		
# observations	323	211
HC	.46	.54
CF	.38	.58
PRE	.31	.42
CD	.36	.36
PREP	.31	.48
CDP	.37	.48
POST	.38	.09
POSTP	.30	.15
1981		
# observations	297	206
HC	.29	.57
CF	.25	.55
PRE	.29	.45
CD	.22	.33
PREP	.25	.40
CDP	.20	.37
POST	-.01	-.02
POSTP	.01	-.03

See Appendix C for definitions of variables.

* Source: Beaver, W., and W. Landsman. Incremental Information Content of Statement 33 Disclosures. Financial Accounting Standards Board, 1983.

acquisitions and report higher earnings. Thus, it is possible that the firms which are eliminated had a larger proportion of adjuster firms than the firms in the full replication sample.

In summary, Tables I thru V report the reconciliation of sample sizes and compare the BL sample with the full replication sample by industry composition, summary statistics for return and the other earnings variables, selected correlations among the earnings variables, and by correlation between security returns and the other earnings variables. It is concluded that, other than sample size, level of earnings, and degree of correlation among the earnings variables, it appears that the full replication sample is similar to or at least a fair approximation of the BL sample.

The Adjuster Regression

This section presents and discusses the process of partitioning the full replication sample into adjuster and nonadjuster firms. Of the 356 firms, 24 are found to be adjuster firms at greater than a 97.7 percent confidence.

Adjuster firms are detected by regressing the estimated life of current period purchases of depreciable assets (Lt) on the current period anticipated inflation (AI_t). A negative slope coefficient is expected for adjuster firms

TABLE VI

THE ADJUSTER FIRM-DETECTING REGRESSION
CALCULATED T-SCORES

Calculated T-Score	Number of companies	percentage
> 2.0	12	3.4
1.5 thru 2.0	14	4.0
1.0 thru 1.5	24	6.7
0.5 thru 1.0	47	13.2
0.0 thru 0.5	64	18.0
-0.5 thru 0.0	60	16.9
-1.0 thru -0.5	44	12.3
-1.5 thru -1.0	42	11.8
-2.0 thru -1.5	25	7.0
< -2.0	24	6.7
Total	356	100.0

and a calculated t-score of less than -2.0 is required for a 97.7 percent confidence for this one-tailed test.

Table VI provides the calculated t-scores for the 356 firms in the full replication sample. This table indicates 24 firms are found to have calculated t-scores of less than -2.0; thus 24 (or more than 6.7 percent) of the 356 companies are found to be adjuster firms with greater than a 97.7 percent confidence.

Examination of the distribution of companies for each level of calculated t-score in Table VI reveals that the distribution is almost normal but biased downward (i.e. there are more companies with negative t-scores than a normal distribution would predict and fewer companies with positive t-scores than a normal distribution would predict).

This result would be expected if many firms were trying to adjust and either doing so with varying degrees of success or if measurement error were present in the estimates of the life of current period purchases of depreciable assets (L_t). Either way, it appears that there are more adjuster firms than a normal distribution would predict.

Table VII provides a breakdown by industry of the results of the adjuster regression. Nearly half of the adjuster firms (11/24 firms) are in the utilities industry. These results represent 16.9 percent of the 65 utilities firms in the full replication sample (compare Table II with Table VII). The fact that utilities are regulated may help to explain the large number of adjusters in that industry. Olsen (1985) expects no incremental information content for SFAS 33 earnings variables because utility rates (and thus, cash receipts) are usually based on historical cost equity. Historical cost equity (and thus, cash receipts) can be adjusted by adjusting the historical cost depreciation expense. For these reasons, utility managers may have a greater incentive to be adjusters than other managers. Except for the other nonmanufacturing industry (with 1 adjuster out of 5 firms) no industry other than utilities has more than 10.0 percent adjuster firms in the full replication sample. The petroleum and rubber and the transportation and communication industries are next after

TABLE VII

INDUSTRY COMPOSITION OF ADJUSTER FIRMS

Industry	Number of Companies
Chemicals	2
Financial insurance	0
Food, tobacco, and textiles	1
Lumber, paper, and allied products	0
Machinery	1
Mining and construction	0
Other nonmanufacturing	1
Other manufacturing	2
Petroleum and rubber	2
Primary and fabricated metals	1
Transportation and communication	2
Transportation equipment	1
Utilities	11
Wholesale and retail trades	0
Total	24

utilities in concentration of adjusters with 10.0 (2/20 firms) and 9.5 (2/21 firms) percent, respectively.

Summary

This chapter presents the results of the first stage (identifying adjuster firms) of the research. The hypothesis that some managers are varying their estimates of the useful lives of current period acquisitions inversely with anticipated inflation is accepted for 24 of 356 firms at greater than a 97.7 percent confidence level. The

presence of adjuster firms in their sample indicates that the BL research results may be biased against finding incremental information content for the SFAS No. 33 earnings numbers. The next chapter presents the results of Stage Two (the BL replication) of this research.

CHAPTER V

RESULTS OF STAGE TWO (HYPOTHESIS TWO): REPLICATION OF BEAVER-LANDSMAN

The purpose of this chapter is to present and compare the results of the full and the reduced replications of the two-stage regression performed by BL. These results provide an indication that eliminating the adjuster firms does not appear to change or affect the full replication sample results or the BL results or conclusions.

The tables in this chapter provide data in three columns. The first column reproduces the published BL research results for ease of comparison. The second column provides the results obtained from the full replication. The third column provides the results obtained from the reduced replication (i.e. when the adjuster firms are eliminated).

The Beaver and Landsman Replication

Table VIII is a two-page table which duplicates BL Table 17 and provides and compares the published BL research

first-stage results with the results of the full replication and the results of the reduced replication obtained by eliminating the adjuster firms. As reported by BL, the t-scores are all significant at conventional levels, assuming normality and independence. This significance did not change in either the full replication or the reduced replication. These high t-scores are consistent with the high correlations reported in Table V.

Table IX is a two-page table which duplicates the first part (the left-hand side) of BL Table 18 and provides and compares the published BL research second-stage results with the results of the full replication and the results of the reduced replication obtained by eliminating the adjuster firms. Again, eliminating the adjuster firms does not appear to significantly affect the full replication sample results.

Table X duplicates the second part (the right-hand side) of BL Table 18 and provides and compares the published BL research R^2 (proportion of variance explained) results with the results of the full replication and the results of the reduced replication obtained by eliminating the adjuster firms. On page 60, BL report, "In 1979 the maximum difference in R^2 is 2 percent [24 percent (by adding POSTP) versus 22 percent (for HC alone)]." Likewise, the full replication has a 1979 maximum difference in R^2 of 7 percent [26 percent (by adding POSTP) versus 19 percent (for HC alone)]. Similarly, the reduced replication has a 1979

TABLE VIII

REGRESSION COEFFICIENTS (B_t) FOR
TWO-STAGE REGRESSIONS: 1979-1981
(FIRST-STAGE RESULTS)
PAGE 1

Other Earnings Variables	Other Earnings Constructed Orthogonal to Historical Cost Earnings		
	BL*	BL Rep	Reduced Rep t-calc < -2.0
1979			
# observations	392	266	248
CF	.30	.45	.44
	(15.0)	(30.1)	(30.1)
POST	.02	.008	.008
	(1.4)	(0.4)	(0.5)
POSTP	.07	.04	.04
	(4.8)	(4.9)	(4.5)
1980			
# observations	323	211	204
CF	.58	.71	.71
	(20.3)	(38.2)	(37.4)
POST	.08	.06	.07
	(6.4)	(4.1)	(4.6)
POSTP	.12	.07	.08
	(5.8)	(5.0)	(5.6)
PRE	1.45	1.66	1.68
	(18.2)	(17.5)	(17.2)
PREP	.79	.97	.97
	(19.2)	(20.1)	(19.4)
CD	1.4	1.54	1.56
	(17.3)	(16.5)	(16.2)
CDP	.78	.95	.95
	(19.5)	(19.6)	(19.0)

Continued on next page

TABLE VIII (Continued)

Other Earnings Variables	Other Earnings Constructed Orthogonal to Historical Cost Earnings		
	BL*	BL Rep	Reduced Rep t-calc < -2.0
1981			
# observations	297	206	199
CF	.58	.78	.78
	(17.9)	(46.5)	(46.2)
POST	.05	.04	.04
	(3.8)	(2.1)	(2.1)
POSTP	.06	.03	.03
	(3.8)	(1.4)	(1.3)
PRE	1.37	1.27	1.29
	(16.7)	(14.6)	(15.0)
PREP	.85	.96	.96
	(17.5)	(16.2)	(16.2)
CD	1.1	1.20	1.22
	(14.1)	(12.8)	(13.1)
CDP	.74	.92	.92
	(14.4)	(16.5)	(16.8)

[a]Table reports regression coefficients (B_t) with t-values in parentheses.

[b]First-Stage regression: $X_{it} = A_t + B_t HC_{it} + Z_{it}$

See Appendix C for definitions.

* Source: Beaver, W., and W. Landsman. Incremental Information Content of Statement 33 Disclosures. Financial Accounting Standards Board, 1983.

TABLE IX

REGRESSION COEFFICIENTS (B_{jt}) FOR
TWO-STAGE REGRESSIONS: 1979-1981
(SECOND-STAGE RESULTS)
PAGE 1

Other Earnings Variables	Regression Coefficient					
	BL*		BL REP		Reduced Rep t-calc < -2.0	
	B_{1t}	B_{2t}	B_{1t}	B_{2t}	B_{1t}	B_{2t}
1979						
# observations	392		266		248	
CF	.33	.46	.28	.73	.26	.75
	(11.0)	(6.0)	(8.2)	(5.1)	(7.5)	(5.0)
POST	.33	-.14	.28	-.26	.26	-.23
	(10.5)	(-1.5)	(7.9)	(-2.2)	(7.1)	(-1.8)
POSTP	.33	.35	.28	1.23	.26	1.11
	(10.6)	(3.1)	(13.7)	(5.2)	(7.4)	(4.5)
1980						
# observations	323		211		204	
CF	.55	.11	.55	.75	.55	.72
	(9.3)	(1.0)	(9.6)	(3.5)	(9.2)	(3.4)
POST	.55	.68	.55	-.31	.55	-.27
	(9.3)	(2.7)	(9.3)	(-1.1)	(9.0)	(-.9)
POSTP	.55	.54	.55	-.17	.55	-.27
	(9.3)	(3.4)	(9.3)	(-.6)	(9.0)	(-.4)
PRE	.55	-.02	.55	.004	.55	.01
	(9.3)	(-.5)	(9.3)	(.1)	(9.0)	(.3)
PREP	.55	-.05	.55	.11	.55	.11
	(9.3)	(-.7)	(9.3)	(1.3)	(9.0)	(1.3)
CD	.55	.05	.55	-.06	.55	-.05
	(9.3)	(1.2)	(9.3)	(1.3)	(9.0)	(-1.2)
CDP	.55	.09	.55	.10	.55	.10
	(9.3)	(1.1)	(9.3)	(1.2)	(9.0)	(1.2)

continued on next page

TABLE IX (Continued)

Other Earnings Variables	Regression Coefficient					
	BL*		BL Rep		Reduced Rep t-calc < -2.0	
	B_{1t}	B_{2t}	B_{1t}	B_{2t}	B_{1t}	B_{2t}
1981						
# observations	297		206		199	
CF	.21	.09	.50	.10	.50	.08
	(5.1)	(1.2)	(9.8)	(.5)	(9.7)	(.4)
POST	.21	-.22	.50	-.37	.50	-.38
	(5.1)	(-1.2)	(9.8)	(-1.8)	(9.7)	(-1.8)
POSTP	.21	-.17	.50	-.23	.50	-.23
	(5.1)	(-1.0)	(9.8)	(-1.4)	(9.7)	(-1.4)
PRE	.21	.07	.50	.05	.50	.05
	(5.1)	(2.3)	(9.8)	(1.1)	(9.7)	(1.1)
PREP	.21	.06	.50	-.05	.50	-.06
	(5.1)	(1.2)	(9.8)	(- .8)	(9.7)	(-1.0)
CD	.21	.03	.50	-.04	.50	-.04
	(5.1)	(.9)	(9.8)	(-1.2)	(9.7)	(-1.0)
CDP	.21	.02	.50	-.10	.50	-.11
	(5.1)	(.4)	(9.8)	(-1.6)	(9.7)	(-1.6)

[a]First-stage regression: $X_{it} = A_t + B_t HC_{it} + Z_{it}$

Second-stage regression:

$$RETURN_{it} = A_t + B_{1t} HC_{it} + B_{2t} Z_{it} + U_{it}$$

Table reports regression coefficients (B_{jt}) with t-values in parentheses.

See Appendix C for definitions.

* Source: Beaver, W., and W. Landsman. Incremental Information Content of Statement 33 Disclosures. Financial Accounting Standards Board, 1983.

TABLE X

PROPORTION OF VARIANCE EXPLAINED (R^2)

	BL*	BL Rep	REDUCED Rep t-calc < -2.0
1979			
# observations	392	266	248
CF	.29	.26	.24
POST	.22	.20	.17
POSTP	.24	.26	.23
HC	.22	.19	.17
1980			
# observations	323	211	204
CF	.21	.33	.32
POST	.23	.29	.28
POSTP	.24	.29	.28
PRE	.21	.29	.28
PREP	.21	.29	.29
CD	.21	.29	.29
CDP	.21	.29	.29
HC	.21	.29	.28
1981			
# observations	297	206	199
CF	.09	.32	.32
POST	.09	.33	.33
POSTP	.09	.32	.32
PRE	.10	.32	.32
PREP	.09	.32	.32
CD	.08	.32	.32
CDP	.08	.32	.33
HC	.08	.32	.32

See Appendix C for definitions.

* Source: Beaver, W., and W. Landsman. Incremental Information Content of Statement 33 Disclosures. Financial Accounting Standards Board, 1983.

maximum difference in R^2 of 6 percent [23 percent (by adding POSTP) versus 17 percent (for HC alone)]. For 1980 there is no difference in the R^2s for the full replication and the maximum difference in R^2 for the reduced replication is 1 percent (shared by CD, PREP, and CDP). For 1981 the maximum difference in R^2 is 1 percent (obtained by adding POST) for the full replication and the maximum difference in R^2 for the reduced replication is also 1 percent (shared by CDP and POST).

BL state, "When a second explanatory variable is added, the R^2 cannot decrease. Is the increase in R^2 statistically significant? The t-scores for the regression coefficients are reported in Table 18 and, under appropriate assumptions, provide evidence as to whether the increase in R^2 is statistically significant." (p. 61)

On page 63, BL report a t-score of 5.1 or higher for HC (B_{1t}) in all three years. Likewise, as reported in Table IX, the t-score for HC is 7.9 or higher in all three years for the full replication and 7.1 or higher in all three years for the reduced replication. BL find the CF residual to be positive in all three years, but not significantly different from zero at conventional levels in 1980 and 1981. Likewise, in both the full and the reduced replications the CF residual is positive in all three years, but not significantly different from zero at conventional levels in 1981. While BL find the regression coefficient for POST to

have the 'wrong' sign in two years (1979 and 1981), in both the full and the reduced replications the regression coefficient for POST has the 'wrong' sign in all three years. BL find the regression coefficient for POSTP to be positive and significant in 1979 and 1980, but negative and not significant in 1981. Likewise, in both the full and the reduced replications the regression coefficient for POSTP is positive and significant in 1979, but negative and not significant in 1980 and 1981. BL report both PRE and PREP as reversing sign in 1980 and 1981, while in both the full and the reduced replications PRE is positive in both years and only PREP reverses sign. BL also report CD and CDP to have the 'correct' but nonsignificant sign, while in both the full and the reduced replications only CDP has the 'correct' sign (still nonsignificant) in 1980.

The reduced replication discussed above is examined at an arbitrary cutoff t-score value of -2.0. The sensitivity of the reduced replication results to varying the cutoff level of the t-scores was also examined (but not discussed) at several levels (e.g. -2.0, -1.9, -1.8 -1.65, etc.). No modification is found to be significant (i.e. the reduced replication results appear the same, no matter what the cutoff level of t-score).

To summarize the above discussion, the full replication sample results are similar to the results obtained by BL, even though the full replication sample may not be a fair approximation of the BL sample. Second, the reduced

replication results are similar to the results obtained by both the full replication and by BL.

BL conclude, "While the explanatory power of HC is clear-cut, the incremental explanatory power of the SFAS No. 33 variables is not." (p. 63) The current research finds that eliminating the adjuster firms does not appear to change or affect the full replication sample results or, to the extent that the full replication sample is a fair approximation of the BL sample, the BL results or conclusions.

Summary

In this chapter the results of the full and the reduced replications are presented, compared and discussed. It is concluded that, while the adjuster firm bias may be present, that bias is not sufficient in and of itself to cause the BL finding of no incremental information content for SFAS No. 33 earnings variables. The next chapter provides a summary of the research, discusses some limitations of the research, and concludes by offering some suggestions for future research.

CHAPTER VI

SUMMARY AND CONCLUSIONS

This chapter presents an overview of this research and a summary of the results and conclusions. Some limitations of the research are discussed and some recommendations for future research are offered.

Overview and Conclusions

The primary purpose of this research is to determine if SFAS No. 33 earnings numbers may be garbled because managers explicitly or implicitly vary the estimated useful lives of current period purchases of depreciable assets inversely with the anticipated inflation rate. The two basic conclusions of this research are:

1) some managers do appear to vary explicitly or implicitly the estimated useful lives of current period purchases of depreciable assets inversely with the anticipated inflation rate, and
2) to the extent that the full replication sample is a fair approximation of the BL sample, it does not appear that this effect is sufficient in and of itself to affect significantly the published BL research results and conclusions.

In this research, a sample (the full replication sample) which is as similar to that used by BL as possible is selected and the major portions (Chapter Three) of the BL research are replicated. The two samples are compared by characteristics such as industry composition, summary statistics for return and the other earnings variables, various correlations, etc. It is found that the firms in the full replication sample are generally older and reported lower earnings than the firms in the BL sample. The firms in the full replication sample also have higher correlations among the earnings variables than the firms in the BL sample.

A regression is performed that is designed to detect those firms (adjuster firms) whose managers are explicitly or implicitly varying the estimated useful lives of current period purchases of depreciable assets inversely with the anticipated inflation rate. These adjuster firms are eliminated from the full replication sample to obtain the reduced replication sample. The BL research is replicated again using the reduced replication sample and the results of the full replication are compared with the results of the reduced replication, and with the published BL research results.

The regression coefficients of the SFAS No. 33 earnings variables in the BL research show reversals of both sign and significance in various years. The results of the full replication are similar to those of the BL research, and the

results of the reduced replication are similar to those of the full replication. It appears that, to the extent that the full replication sample is a fair approximation of the BL sample, the current research lends support to the BL conclusion of no incremental information content for the SFAS No. 33 earnings variables.

Limitations

A significant limitation of the current research is its inability to capture all of the potential double counting of inflation. For example, another possible means of adjusting for anticipated inflation is in the valuation of inventory and cost of goods sold (e.g. use of the Last-In First-Out flow assumption). The implication of this limitation is that the results of this research are conservative in that double counting of inflation may be more widespread than the results show. Other limitations of this research include the methods of detecting adjuster firms and estimating the firm's depreciation convention and depreciation expense on current period acquisitions. These limitations may have biased this research against finding adjuster firms.

Perhaps the most serious limitation of this research is that the full replication sample may not be a fair approximation of the BL sample. More than half of the firms in the BL sample do not have sufficient data on the Compustat tapes to perform the adjuster regression. Also,

the firms in the full replication sample are generally older firms with lower earnings and higher correlations among the earnings variables than the firms in the BL sample. The major purpose of this research is to replicate the BL research and a fair approximation of the BL sample is required for the conclusions of the replication to apply to the BL research. The fact that the 25 years-of-data requirement for the adjuster firm-detecting regression would eliminate all of the younger firms might have been foreseen. However, the fact that the remaining firms in the full replication sample would have lower earnings and higher correlations than the BL sample could not have been foreseen.

Future Research

More research on this subject is perhaps needed in at least three areas. First, a larger full replication sample would be desirable. The Compustat tapes do not have adequate information for the adjuster regression for more than half of the BL sample. The elimination of more than half of the firms may result in the full replication sample being a poor approximation of the BL sample. A fair approximation of the BL sample is required for the results of the replication to be extended to the BL research results. Perhaps the Compustat tape data could be augmented from other sources such as the firm's financial statements

or other published information sources. Another possibility is to use a shorter time period for the adjuster regression so that younger firms can be included in the full replication sample. This result would allow a larger full replication sample, which would be a better approximation of the BL sample.

Second, the ability to detect adjuster firms would be improved by improving the estimates of the lives of current period purchases of depreciable assets. The distribution of adjuster firms is biased toward the negative t-scores, indicating it is possible that more firms are adjusting than the adjuster regression found.

The third area of further research is a modified replication of the BL research. The modification would be to partition the BL sample first into high versus low earnings firms, and then to eliminate the adjuster firms from the high earnings firms sample. Finding incremental information content for the high earnings firms after the adjuster firms were eliminated would still indicate that possibly FASB has moved too fast in repealing the mandatory aspects of SFAS No. 33.

Given the current environment of low inflation, the capital maintenance problems associated with positive inflation are smaller, and the importance of the inflation topic is also reduced. It may be that low inflation reduces the capital maintenance problem to the extent that some firms are adjuster firms only in times of high inflation.

If some firms are adjuster firms only in times of high inflation, a different methodology than the one used in the current research would be required to detect them.

Regardless of the current importance of the inflation topic, the fact remains that adjuster firms may be reporting historical cost earmings numbers which contain measurement errors (the adjustments for anticipated inflation). Financial statement users need comparability among financial statements so they can compare the results of operations of the various reporting firms, but the presence of any adjuster firms may reduce the comparability among 'historical cost' financial statements. Thus, the issue of double counting of inflation may continue to be important in the future.

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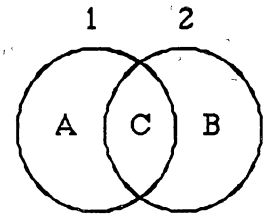
APPENDIXES

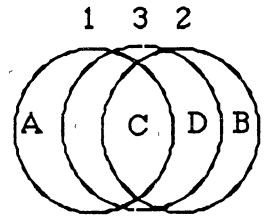
APPENDIX A

THE DOUBLE COUNTING EFFECT

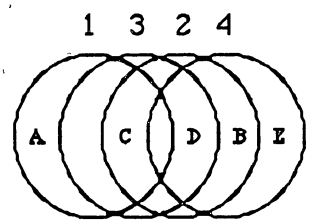
The area of Circle 1 represents the information content of historical cost earnings numbers while the area of Circle 2 represents the information content of inflation-adjusted earnings numbers. Area A represents the incremental information content of historical cost over that of inflation-adjusted earnings numbers. Area B represents the incremental information content of inflation-adjusted over that of historical cost earnings numbers while Area C represents the information content shared by (contained in both) historical cost and inflation-adjusted earnings numbers. Note that if the historical cost earnings numbers were partially adjusted for anticipated inflation, this would be represented by shifting Circle 1 to the right.



Panel B duplicates Panel A and adds Circle 3 to represent the reported historical cost earnings numbers of an adjuster firm. Now Area C plus Area D represents the information content shared by the adjusted historical cost and the inflation-adjusted earnings numbers. Area D represents information content which would otherwise be attributed to the inflation-adjusted earnings numbers but which is preempted by the adjusted historical cost earnings numbers. Note that Area D is an inherent effect of reporting partially adjusted earnings in the primary financial statements and is present regardless of the method used to obtain the inflation-adjusted earnings numbers (i.e. direct estimation or indexing with re-estimated lives as per Paragraph 61 of SFAS No.33).



Panel C duplicates Panel B and adds Circle 4 to represent the inflation-adjusted earnings numbers obtained by indexing the adjusted historical cost earnings numbers without complying with Paragraph 61 of SFAS No.33. Area E represents the 'garbage' generated by double-counting of inflation.



APPENDIX B

THE FIRM'S DEPRECIATION EQUATION

For a firm which follows the full-year convention (i.e. takes a full year of depreciation in the year of acquisition and no depreciation in the year of disposal) depreciation expense in any year (DE_t) consists of the previous year's depreciation expense (DE_{t-1}) increased by a full year's depreciation on current period acquisitions (DEA_t) and decreased by a full year's depreciation on those assets which were fully depreciated in the current period (DED_t). Thus, for a full-year convention firm;

$$DE_t = DE_{t-1} + DEA_t - DED_t \qquad \text{Equation 1-A.}$$

If a firm follows the half-year convention or some other part-year convention, two years will be required for the effect of an acquisition (or an asset reaching the end of its estimated life) to be reflected in total depreciation expense. A fraction (M) of the effect of DEA_t and DED_t will be included in depreciation expense in one year and the remaining fraction (1-M) will be included the next year. Thus, for any firm;

$$DE_t = DE_{t-1} + M(DEA_t - DED_t) + (1-M)(DEA_{t-1} - DED_{t-1}) \qquad \text{Equation 1-B.}$$

Equation 1-B is the firm's depreciation equation. It is valid for any firm regardless of the firm's depreciation method (e.g. straight line or accelerated) or convention (e.g. full year, half year, etc).

Equation 1-B contains the quantity to be estimated (DEA_t), one known quantity (DE_t), and two unknown quantities (DED_t and M), along with the various lagged quantities. To estimate DEA_t, each of the unknown quantities (DED_t and M) must be estimated. DED_t is estimated as the cost of those assets which are disposed of in the current period divided by last year's average useful life (gross plant divided by depreciation expense). This estimate of DED_t is consistent with the assumption that the firm's management estimates the same average useful life for each of the current acquisitions in successive years (i.e. that the firm is a nonadjuster firm).

To estimate M, the firm's depreciation equation is rearranged as follows;

$$DE_t = DE_{t-1} + M(DEA_t - DED_t) + (1-M)(DEA_{t-1} - DED_{t-1})$$

Equation 1-B.

$$DE_t = DE_{t-1} + M*DEA_t - M*DED_t + DEA_{t-1} - DED_{t-1} - M*DEA_{t-1} + M*DED_{t-1}$$

$$DE_t - DE_{t-1} - DEA_{t-1} + DED_{t-1} = M(DEA_t - DED_t - DEA_{t-1} + DED_{t-1})$$

Equation 1-C.

From Equation 1-C it is clear that the firm's depreciation convention (M) can be estimated by regressing $(DE_t-DE_{t-1}-DEA_{t-1}+DED_{t-1})$ on $(DEA_t-DED_t-DEA_{t-1}+DED_{t-1})$ without an intercept term. For this regression DED_t is estimated as above and DEA_t is estimated as the cost of current period acquisitions divided by the current year's average useful life (gross plant divided by depreciation expense).

Once the estimates for DED_t and M are obtained, they are used to obtain the required estimate of DEA_t. Rearranging the firm's depreciation equation again;

$$DE_t = DE_{t-1} + M(DEA_t - DED_t) + (1-M)(DEA_{t-1} - DED_{t-1})$$

Equation 1-B.

$$M(DEA_t - DED_t) = DE_t - DE_{t-1} - (1-M)(DEA_{t-1} - DED_{t-1})$$

$$DEA_t = DED_t + ((DE_t - DE_{t-1} - (1-M)(DEA_{t-1} - DED_{t-1}))/M)$$

Equation 1-D.

The cost of current period acquisitions divided by the above estimate of DEA_t is the estimated useful life of current period acquisitions which is the dependent variable in Regression 1.

APPENDIX C

DEFINITIONS FROM BEAVER AND LANDSMAN

Definitions from Beaver and Landsman (1983)

CF = Cash flow, defined as historical cost earnings plus depreciation, depletion, and amortization.

CD = Income from continuing operations under constant dollar.

CDP = Income from continuing operations under constant dollar plus purchasing power gain or loss.

PRE = Income from continuing operations under current cost.

PREP = Income from continuing operations under current cost plus purchasing power gain or loss.

The CF, CD, CDP, PRE, and PREP variables are each expressed in terms of percentage change in the per share figures.

POST = Income from continuing operations under current cost plus holding gains on the assets during the year due to changes in the current cost of the assets. The variable is expressed as a percentage of stockholders' equity by dividing POST by end-of-year stockholders' equity under current cost.

POSTP = POST plus purchasing power gain or loss minus that portion of the holding gains on the assets during the year which resulted from the general increase in prices. POSTP is divided by stockholders' equity under current cost.

RETURN = Annual common stock dividends plus capital gains divided by the beginning-of-year common stock price.

HC = Historical cost earnings available for common shareholders before extraordinary items. The historical cost variable is the percentage change in earnings per share and is the benchmark against which the FASB Statement 33 data are compared.

VITA

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Area of Specialization: Accounting

Scope of Study: It is hypothesized that, in periods of inflation, managers may inject an adjustment for inflation into reported historical cost earnings numbers. When these numbers are restated in compliance with SFAS 33, a double counting of the effects of inflation results. Most information content studies of SFAS 33 mandated earnings numbers ignore this possibility. To the extent that managers do include an adjustment for inflation in reported historical cost earnings numbers, these extant studies may be biased against finding incremental information content in the SFAS 33 disclosures.

Findings and Conclusions: The first objective was to partition a sample of firms into adjuster and nonadjuster firms. Regression analysis indicated that some firm managers appear to inject an adjustment for inflation into reported historical cost earnings numbers.

The second objective was to determine if the bias present in previous research was sufficient to affect the results of that research. A replication of the Beaver and Landsman research (BL, 1983) indicated that the bias due to the presence of adjuster firms in the Beaver and Landsman sample did not appear to affect the results of that research.

ADVISOR'S APPROVAL