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I am submitting herewith a dissertation written by James Rosser Collins entitled "An Empirical Investigation Into the Association Between the Financial Bath and Income Smoothing." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Business Administration.

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AN EMPIRICAL INVESTIGATION INTO THE ASSOCIATION BETWEEN THE FINANCIAL BATH AND INCOME SMOOTHING

A Dissertation

Presented for the

Doctor of Business Administration

Degree

The University of Tennessee, Knoxville

James Rosser Collins

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ABSTRACT

A continuing concern of financial statement users is the comparability of financial information. Within the current framework of accounting principles, certain practices are possible which may reduce interperiod and intercompany comparability of financial statement data. One of the factors that may affect comparability is the postulated tendency of the managements of some firms to attempt to manage their reported earnings streams over time. Two of the most important of possible income management methods are the financial bath and income smoothing.

If an enterprise attempts to manage income by taking financial baths in certain periods, it may also attempt to manage income during the intervening periods by smoothing income. This assumption is the foundation for this project. By dichotomizing firms into those that may attempt income management and those that may not, it is asserted that enterprises taking financial baths also have smoother income streams during the intervening periods between bath years than enterprises not taking baths.

The general approach taken in this study is to select two samples of possible bath companies and a sample of non-bath companies (the control group) and to compare the dispersion around trend lines for 14 selected variables for each of the two bath company samples to the dispersion around the trend lines for the control group. One of the two bath company samples consists of companies disclosing bath items in their financial statements during the period 1973-1976,

while the other is comprised of companies that may be disguising bath items in aggregate financial statement categories during this period. The 14 selected variables consist of six income variables (such as income before extraordinary items and discontinued operations) and eight nonincome variables (such as dividends per share). Dispersion around the trend lines is measured by (1) coefficients of variation, and (2) the mean absolute percentage deviation of the actual changes in a variable from its trend.

The results indicate that there are differences between the properties of the bath company samples and the control group. For the bath company sample which disclosed bath items, the sets of dispersion-measurement values for the six income variables and the taxes variable are significantly greater (at the 0.05 level) than those for the control group. The evidence does not support the assertion that there are significant differences for the remaining seven variables. For the bath company sample representing companies possibly disguising bath items, the sets of dispersion-measurement values for the six income variables and the taxes variable are significantly greater than those for the control group before elimination of the bath years. After elimination of the bath years, the evidence does not support the assertion that there are significant differences between the sets of values for this bath company sample and the sets of values for the control group for the 14 variables.

It is concluded that there are significant differences between the income streams for bath companies and the income streams for non-bath companies. In this study the assertion is tested that the

income streams for bath companies are smoother than the income streams for non-bath companies. The results indicate that the opposite conclusion must be drawn; the income streams for non-bath companies are smoother than those for bath companies. In addition, bath companies may add and discontinue operations more often than non-bath companies providing them with greater opportunity to use the financial bath. Greater fluctuations may be introduced into their earnings streams as a result.

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CHAPTER I

IDENTIFICATION OF RESEARCH AREA

The quality of financial information provided to users of financial statements has improved substantially due to the promulgation of accounting standards and disclosure requirements by authoritative bodies. The result of these standards has been to reduce the freedom of management of business enterprises to choose (1) whether certain changes in economic resources must be included in net income calculations, as well as to choose (2) the specific methods (from among accepted alternatives) that are to be used in the determination of net income for a given period. The objective of these standards is to improve the ability of the users of financial statement data to assess the prospective risks and returns associated with an enterprise and thereby to increase the efficiency of the process of allocation of scarce resources to production and distribution activities.

Even though much progress has been made, considerable work needs to be done. For example, it is asserted that the credibility of financial reporting has actually eroded in recent years (40, p. 4). While some pronouncements have improved accounting and reporting practices, others have not. Additional standards, therefore, need to be developed in certain problem areas. In addition, criticisms of specific accounting and reporting practices have come to the attention of the Financial Accounting Standards Board (FASB) that may be causing skepticism about the financial reporting process (40, p. 5). If these criticisms are to be answered, evidence must be gathered regarding

their validity. Only then can steps be taken to improve the credibility of the financial reporting process.

The present study has been undertaken in order to provide empirical evidence regarding two of these criticisms. In following sections the research area of interest is discussed, the scope of the project is developed, and a methodology for gathering empirical evidence regarding this problem is presented.

General Nature of the Problem

Discussion of Comparability

A continuing concern of investors, creditors, and other financial statement users is the comparability of financial information.

> Comparability means the ability to bring together for the purpose of noting points of likeness and difference. Comparability of financial information generally depends on like events being accounted for in the same manner. Comparable financial accounting information facilitates conclusions concerning relative financial strengths and weaknesses and relative success, both between periods for a single enterprise and between two or more enterprises (2, paragraph 95).

The Accounting Principles Board (APB) considered comparability one of the most important objectives of financial accounting and attempted to narrow areas of differences in accounting practices not justified by differences in circumstances (2, paragraph 105). The APB recognized that the use of alternative accounting practices, when circumstances do not appear to be sufficiently different to justify different practices, is an important problem (2, paragraph 101).

Comparability is desirable within and between enterprises and can be viewed in three ways (39, pp. 161-162). The first view is

that reasonable comparability can be obtained over time for a single enterprise by consistent use of procedures. Proponents of this view believe, however, that comparability is difficult to obtain for two or more enterprises. The opposite view is that comparability can be obtained by requiring all enterprises to utilize a uniform set of accounting methods. The third view is a compromise between these first two approaches. This view recognizes that comparability for a single enterprise over time is easier to achieve than comparability between enterprises, but there is still a need for comparability between enterprises if financial statements are to be of value.

These views of comparability are directed at the input side of the accounting process and can be termed input consistency (62, p. 71). Input consistency is obtained when firms holding similar assets or performing similar activities in the same economic environment report the same information in their financial statements. The authoritative bodies that determine accounting standards (such as the FASB and its predecessor, the APB) generally seek to select one accounting principle from among several that may be used in a given situation in order to ensure that firms consistently apply the same principles to a given event in a given situation.

The input rules, however, may be completely consistent and yet still produce information that results in misleading comparisons. As a result, it is necessary that output comparability be obtained (62, p. 71). Output comparability results from the attempt to help users make comparisons by improving the disclosures in the financial statements. Input consistency is a necessary condition for output comparability, but is not sufficient. The lack of a complete record

(rather than the lack of consistent principles) may be the main reason that the financial reporting process does not produce comparable information (62, p. 77).

Within the current framework of accounting principles and methods, certain practices are possible which may reduce interperiod and intercompany comparability of financial statement data. For example, differences in industry characteristics, differences in firm circumstances at any given time, differences in organizational structures, differences in risk levels, all may affect comparability.

An additional factor that may affect comparability is the postulated tendency of the management of some firms to attempt to manage their reported earnings streams over time in order to obtain some perceived benefit for themselves and/or for the owners of their firms. Two of the most important of possible income management methods are the financial bath and income smoothing. These activities reduce comparability, both interperiod and interfirm, to some degree. These two practices are considered in the current study and a methodology for gathering empirical evidence regarding the relationship of these two practices is presented.

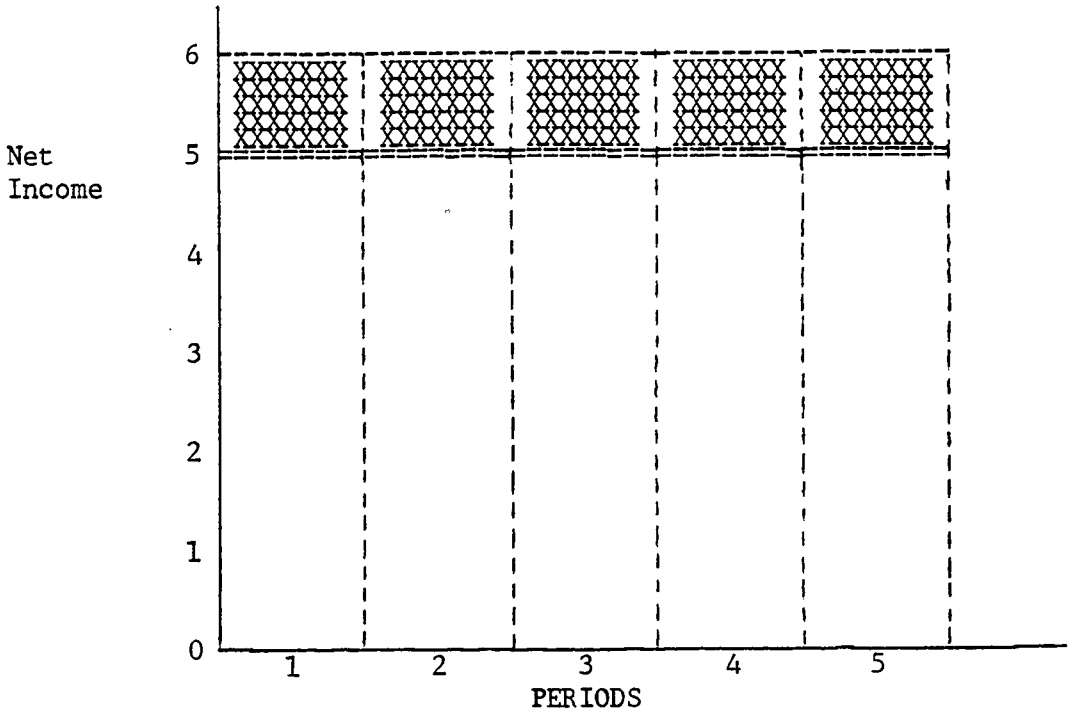
Description of the Financial Bath

A practice that may affect comparability of financial statements is often called the financial bath (30, p. 63). The bath is generally defined to be a clean-up of balance sheet accounts in which assets are written down or written off, and/or provisions are made for anticipated losses and expenses. These actions are discretionary on the part of management and result in a reduction of reported income

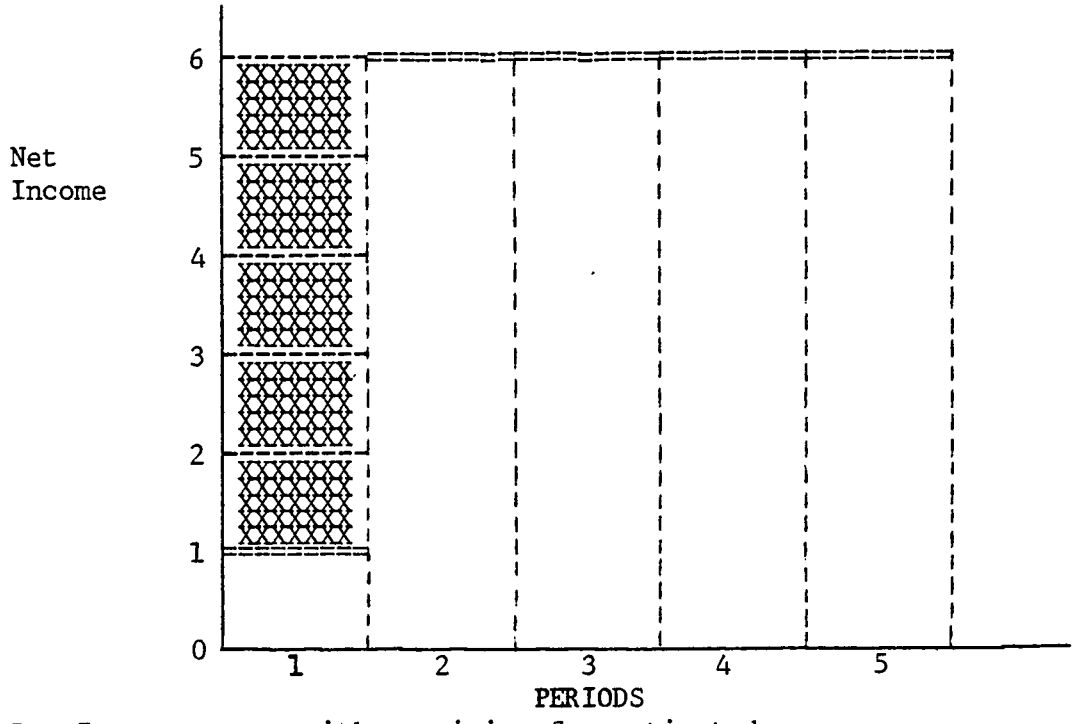
in the bath period. If a bath is taken in a given period, either (1) future reported income is increased by recognition of expenses in the bath period rather than in future periods, or (2) past reported income was increased by postponement of recognition of certain expenses until the bath period. The discretionary nature of bath items arises from management's ability to influence the kind, the amount, and the timing of recognition of the adjustments. Their application must be consistent with generally accepted accounting principles.

It has been asserted that a bath occurs under certain conditions. First, a bath may occur during a period when the earnings of a company decline significantly or when there is a loss (20, 82). Next, a bath may occur during a period when the market price of a company's common stock declines (50), or during a period when the management of a company undergoes significant change (64). In addition, it has been asserted that a bath may become necessary due to use of inferior accounting practices (78). Past research has indicated that the number of companies taking a bath in a given year is small and that the bath is not a widespread phenomenon (30, p. 66).

These concepts can be illustrated by diagrams showing the breakeven point (0), and profits (or losses) above or below that point resulting from a given level of revenues and expenses. The level of profits (or losses) is represented by a double line. In Figure 1.1.A. a given profit for each of five periods is represented. Economic revenues and expenses are assumed to be constant each period, producing a constant economic profit. It is further assumed that timing of the recognition of part of the expenses (represented by

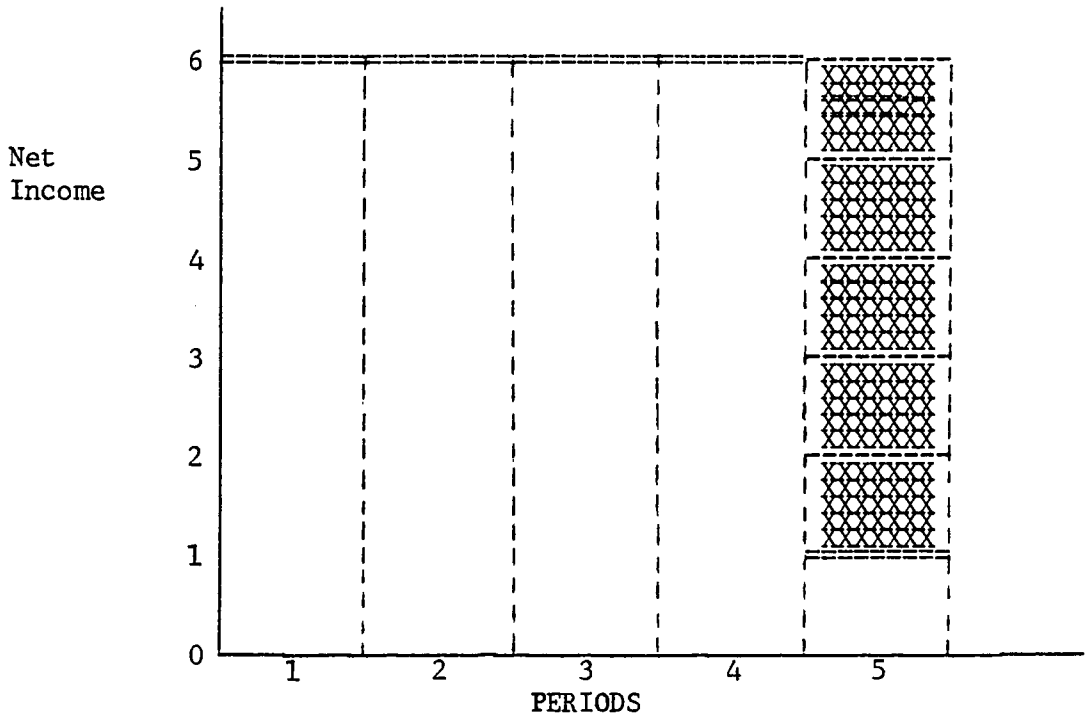


A. Income stream with no bath items.



B. Income stream with provision for estimated expenses.

Figure 1.1. Bath item effects.



C. Income stream with write off or write down of assets.

Figure 1.1 (contined)

the cross-hatched areas) is subject to the exercise of management's judgement and can be varied between periods.

Using this example, the two basic types of bath items can be shown. In Figure 1.1.B. it is assumed that a provision for estimated expenses is computed in the first period that is equivalent to the sum of the cross-hatched expenses in Figure 1.1.A. In this case all of these expenses are recognized as a bath item in the first period and none in periods two through five. This leads to a much lower reported profit in the first period and to higher reported profits in the remaining periods. In Figure 1.1.C. it is assumed that the cross-hatched areas from Figure 1.1.A. represent assets that should be written down or written off each period in order to properly compute economic profit or loss. If this is not done, there is a build-up of unrecognized period losses that at some point must be recognized. If these expenses are all recognized in period five, rather than evenly through periods one to five, the enterprise shows a higher reported profit in periods one to four, and has a much smaller reported profit in period five.

From this example it can be seen that total reduction of reported income over a period of time is not changed by the use of a financial bath. Variation can be concentrated within one year rather than being spread over several years, but total variation in terms of the absolute number of dollars remains the same.

The question arises as to whether concentration of variation in income in a single year is of benefit to an enterprise. The fact that some enterprises do take financial baths indicates that some managements consider it to be of benefit. For example, Robert Amen,

a vice president of Combustion Engineering, Inc., advises that in a bear market, companies should: "Consider writing off those bad results that you have been hiding for years. After all, if your stock is down 50 percent already, how much worse can it get?" (22, p. 54)

Description of Income Smoothing

A second practice that may affect comparability is income smoothing. The income smoothing hypothesis, formulated by Hepworth (48), asserts that management should attempt to smooth reported income and rate of growth in reported income. Management should, within limits of its authority, use methods that reduce reported income when the firm is operating above its long-range normal rate of growth, and increase reported income when the firm is operating below this long-range normal rate of growth.

Support for Smoothing Actions

The major argument in support of income smoothing comes from the theory of capital asset values (17, p. 645). It is commonly assumed that a goal of owners of an enterprise is to maximize the net present value of the enterprise. By maximizing net present value, the personal wealth of the owners is maximized (37, pp. 69-71). The value of an asset (or investment) can be defined as being equal to the net present value of future cash flows (80, Chapter 4). The value of a firm, therefore, is the result of combining a variety of assets and of combining future cash flows produced by those assets.

The value of an asset and its riskiness are related, although the methods of measurement and evaluation of this risk have not been clearly defined by the financial community. In general, however, the risk of an asset is associated with the variability or the dispersion of the probability distributions of future cash flows. This dispersion can be measured by several methods. The most common methods used are the variance and the related standard deviation (square root of the variance).

Two of the ways to incorporate risk into the analysis of a capital budgeting project are the use of a risk-adjusted discount rate or the adjustment of the future cash flows (80, p. 139). The risk-adjusted discount rate is perhaps the most common method used.

> Presumably, the greater the standard deviation of the probability distributions of possible cash flows, the greater the discount rate employed. For a riskless investment, that is, one where there is no standard deviation, the discount rate should be the risk-free rate. As risk increases, higher and higher discount rates are employed (80, p. 137).

It can be seen that as higher discount rates are employed to adjust for greater dispersion in cash flows and higher perceived risk levels, the net present value decreases. A reduction in the dispersion of cash flows may result in a reduction in the perceived risk, a reduction in the discount rate employed, and an increase in net present value.

The information needs of investors and creditors are presumed to be very similar.

> Their basic need is for information useful in assessing prospects for cash flows from dividends or interest and from proceeds of sale, redemption, or maturity of the stock, debt security, loan, or other claim to the resources of a business enterprise that they hold or anticipate

> buying. That, in turn, focuses their attention on information about the enterprise's prospects and ability to bring in cash sufficient for its needs, including payment of interest and dividends--on measures of success or failure of its earning activities (41, pp. 34-35).

Earnings activities are the basic source and use of cash in an enterprise. Expectations by investors and creditors that earnings activities will bring in more cash than is invested enables the enterprise to issue stock and borrow funds for earnings activities. Continued expectations for net cash inflow enable the enterprise to continue to borrow funds and issue additional stock.

The basis on which financial statements are prepared may determine their usefulness to investors and creditors. Emphasis on cash flows suggests that financial statements prepared on a cash receipts and disbursements basis for a period may provide the most useful information. Receipts and disbursements, however, for a short period of time, such as a year, are often not related to each other in such a way that they are useful indicators of an enterprise's earnings activities. It is necessary that other measures of an enterprise's earnings activities be used. The best measure currently available may be the reported income figures produced by generally accepted accounting principles.

> Earnings measured by accrual accounting are generally thought to be the most relevant indicator of an enterprise's cash-earning ability, and measures of earnings for accounting periods are widely used by investors, creditors, security analysts, and others (41, p. 45).

The FASB has indicated that reported earnings measured by accrual accounting is generally considered to be a useful variable in the prediction of cash-earning ability (41, p. 45). Given that this assertion is valid, changes in the dispersion of reported income

around its trend may be of benefit to an enterprise. A reduction in dispersion may reduce perceived risk (and increase enterprise value). Smoothing of income to reduce dispersion, therefore, may be of value to the enterprise if it results in perceived risk reduction.

The FASB has noted that:

> The Board recognizes that some investors may have a preference for investments in enterprises having a stable pattern of earnings, because that indicates lesser uncertainty or risk than fluctuating earnings. That preference, in turn, is perceived by many as having a favorable effect on the market prices of those enterprises' securities (38, paragraph 65).

There is support, therefore, for the understanding that incentives to manage reported income by smoothing techniques do exist.

Basic Kinds of Smoothing

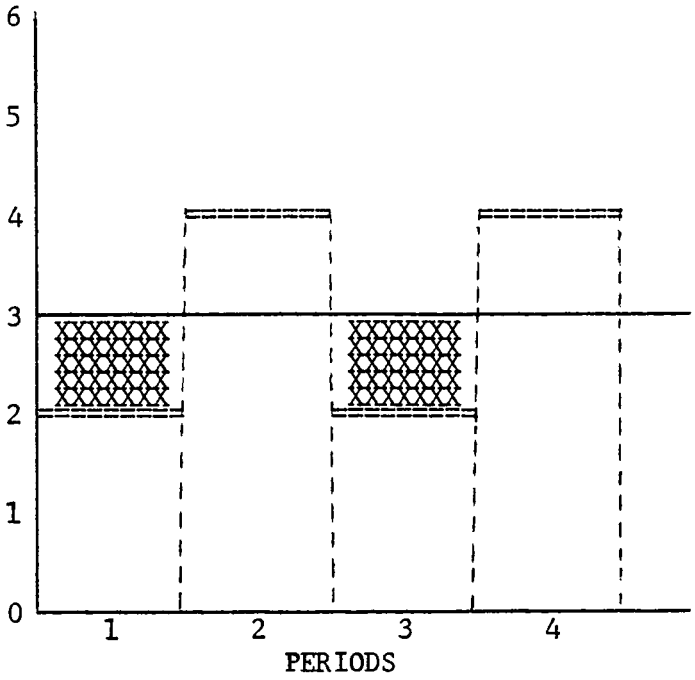
Smoothing can be accomplished by two basic methods. The first method (usually assumed in the conventional smoothing literature) is concerned with the use of discretionary accounting practices to dampen the volatility of reported income trends without affecting the real nature of the income generating process. Discretionary accounting practices are those that do not commit the enterprise to a particular action. Their application is based on professional judgement and must be consistent with generally accepted accounting principles. Management must have control of these practices such that it can defer, eliminate, or accelerate the results (17, p. 658). It is easy to attempt such manipulations since there are a great number of combinations of such practices (27). The second method is to smooth income by use of nonaccounting variables. Examples of

such variables are inventory decisions and pricing decisions made by management in such a way as to smooth input-output series (56, p. 269).

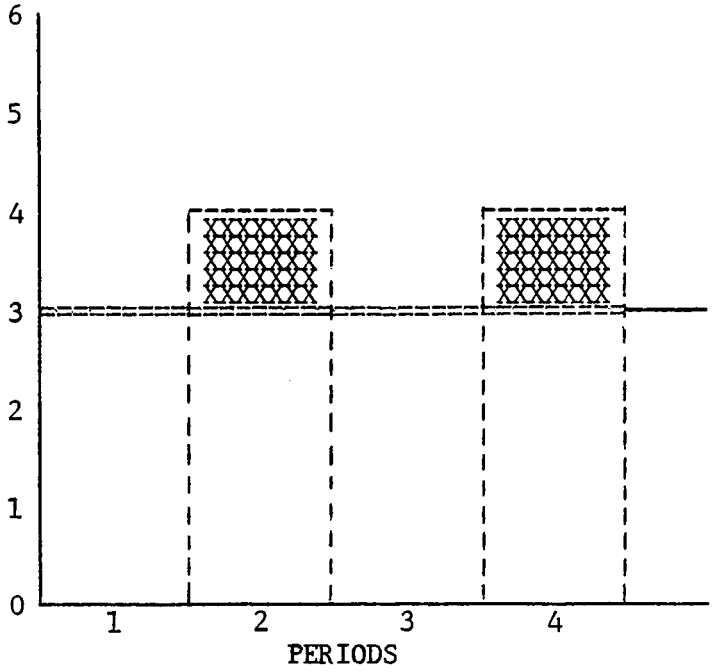
The most useful smoothing variables, however, may be those that do not require disclosure in the financial statements. Such variables (which may be either discretionary accounting or nonaccounting variables) may be capable of affecting investor decisions regarding the firm without changing its real characteristics if outside parties cannot determine that these variables are being used for smoothing purposes (13, pp. 420-421). An example of this technique is management of the timing of end-of-year shipments in order to smooth the reported sales series. If variables which must be disclosed are used to smooth income, such actions may not affect investor perceptions if results of these actions are apparent to outside parties.

Illustrations of Smoothing

The concept of smoothing can be illustrated by diagrams similar to those used to illustrate the financial bath. In Figure 1.2.A. and Figure 1.2.B. it is assumed that smoothing is accomplished through management of expenses. In Figure 1.2.A. it is assumed that a given amount of expenses subject to management (represented by the cross-hatched areas) is incurred in periods one and three, and is not incurred in periods two and four. It is further assumed that the enterprise desires a constant level of reported income in all four periods. By shifting recognition of expenses from periods one and three to periods two and four, respectively, a constant trend can be reported as shown in Figure 1.2.B.



A. Unsmoothed income stream.



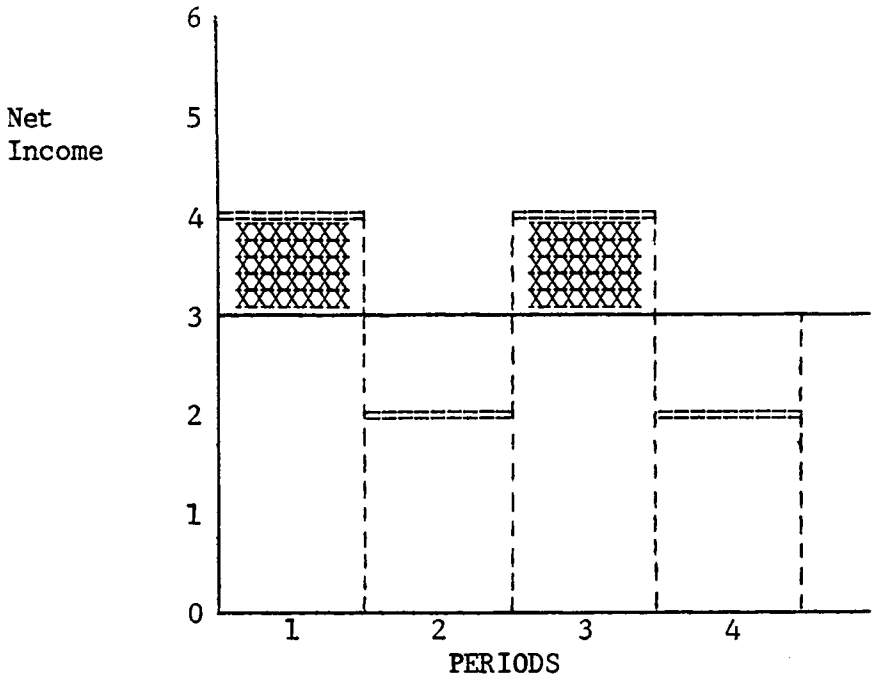
B. Smoothed income stream using expense items.

Figure 1.2. Expense effects.

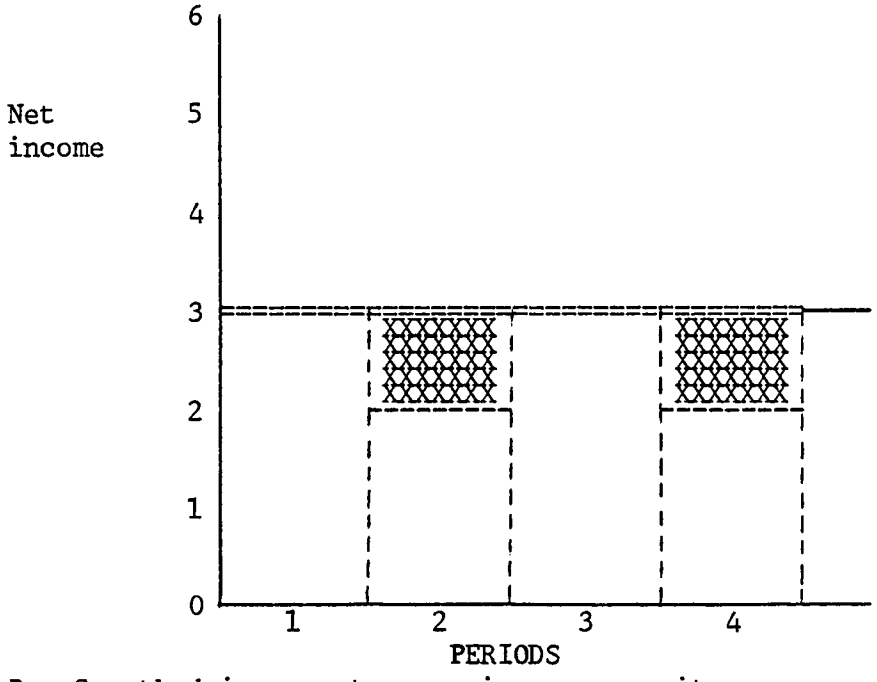
This shift of expenses can be accomplished in two ways. The first way is to shift recognition of the incurrence of the expenses from periods one and three to periods two and four through management of accounting variables without affecting the real nature of the expenses. The second way is through timing of the actual incurrence of the expense. Instead of performing maintenance in periods one and three, for example, the enterprise may be able to postpone maintenance until periods two and four, at which time the expense is recognized. The result is a constant trend, as shown in Figure 1.2.B.

In Figure 1.3.A. and Figure 1.3.B. it is assumed that smoothing is accomplished through management of revenues. In Figure 1.3.A. it is assumed that a certain amount of revenues subject to management (represented by the cross-hatched areas) is received in periods one and three and is not received in periods two and four. As before, it is assumed that the enterprise desires a constant trend of reported income in all four periods. By shifting recognition of the revenues from periods one and three to periods two and four, a constant trend can be reported as shown in Figure 1.3.B.

Like expenses, this shift can be accomplished in two ways. The first way is through accounting policies and conventions such as alternative accounting procedures for recording revenues (for example, various methods of recording installment sales). The second way is through timing of the actual sales transactions. For example, an enterprise may be more aggressive in its marketing activities and/or it may give abnormal discounts at year-end in order to increase sales for a particular year. On the other hand, the enterprise may be less aggressive and delay sales transactions at the end of the year until the following period.



A. Unsmoothed income stream.



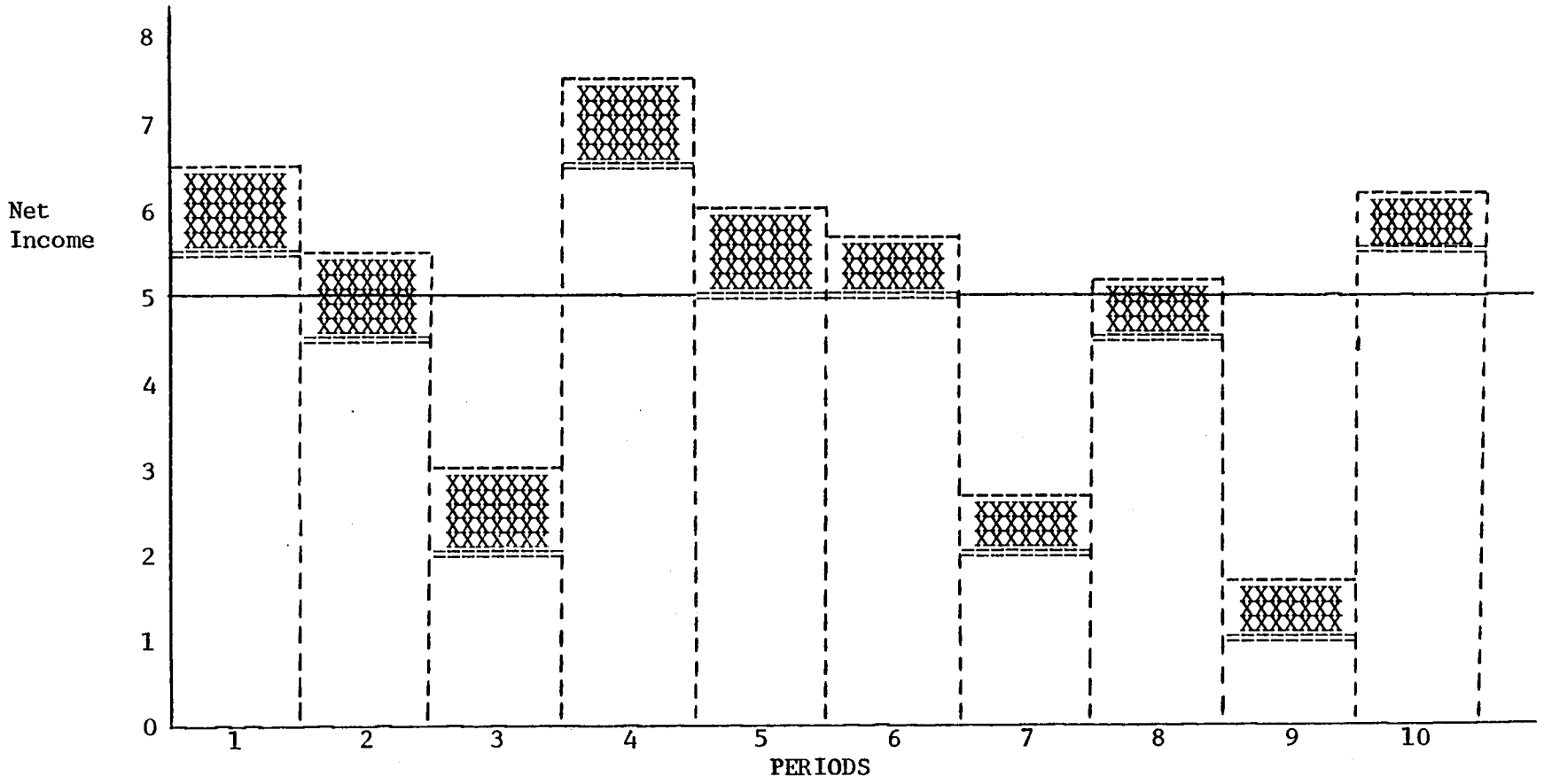
B. Smoothed income stream using revenue items.

Figure 1.3. Revenue effects.

Expected Relationship Between the Two Activities

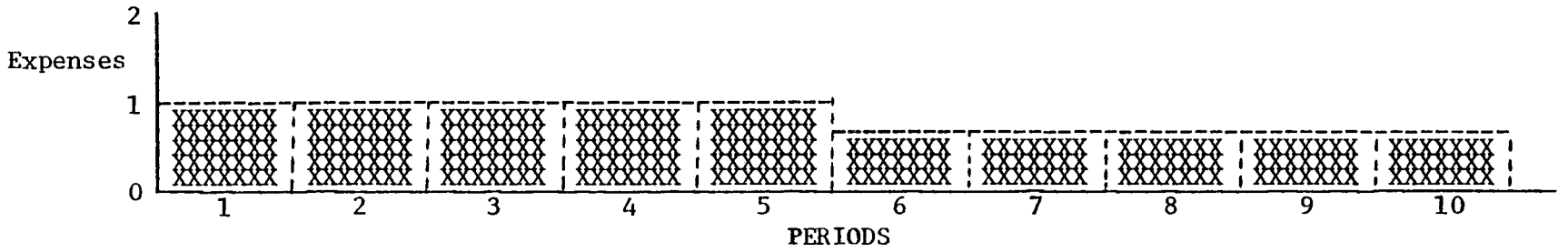
The expected relationship between the financial bath and income smoothing can now be developed. Income smoothing is accomplished through the use of discretionary accounting variables and/or real variables. The bath is accomplished, however, by the use of discretionary accounting techniques. The evidence available from past research has indicated that the number of companies utilizing the financial bath in a specific year is relatively small (approximately 3.12 percent to 7.58 percent during the period 1966-1970) (30, p. 66). This evidence was gathered by requesting annual reports for 1966-1970 from 1,000 companies selected at random from the 1,800 companies listed on the 1968 Compustat tape. The reports received were examined for evidence of bath items (30, p. 65). Since this subset of companies is small, the use of a financial bath in certain years may indicate an attempt to manage the earnings stream by these companies. Since these companies have used income management methods in bath years, they may be more likely to attempt income management by use of income smoothing techniques during intervening time periods than companies not utilizing the bath technique. This assumption is the foundation for this project.

This relationship is illustrated in the following figure. In Figure 1.4.A. it is assumed that an enterprise exhibits the given pattern of profits over 10 periods and that the enterprise has not attempted to manage the reported earnings stream by the use of either smoothing or bath techniques. This pattern of profits includes certain expenses (represented by the cross-hatched areas) that can be treated



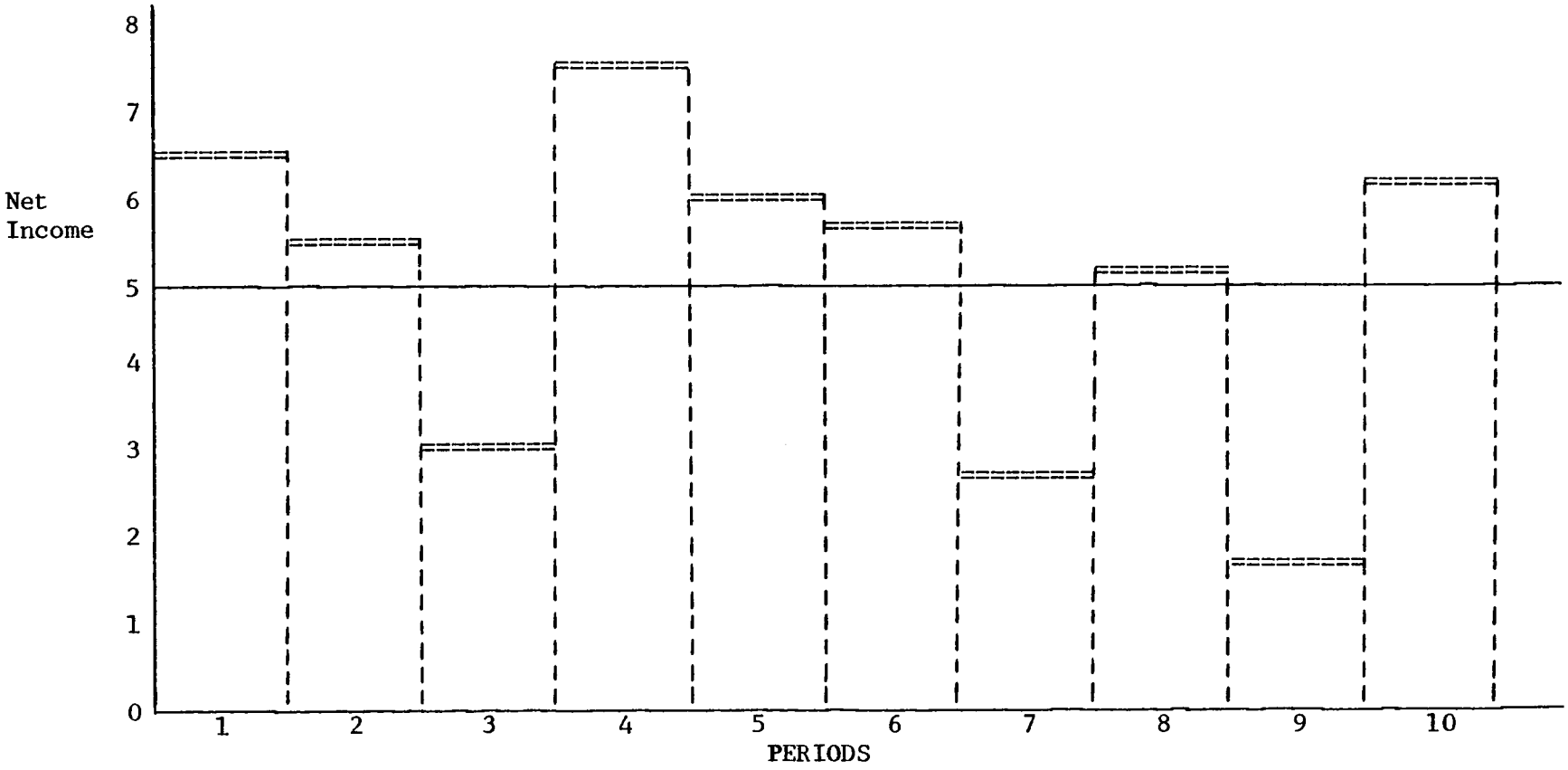
A. Pre-smoothed and pre-bath income.

Figure 1.4. Pattern of earnings expected for company with smoothed income stream and financial bath years.



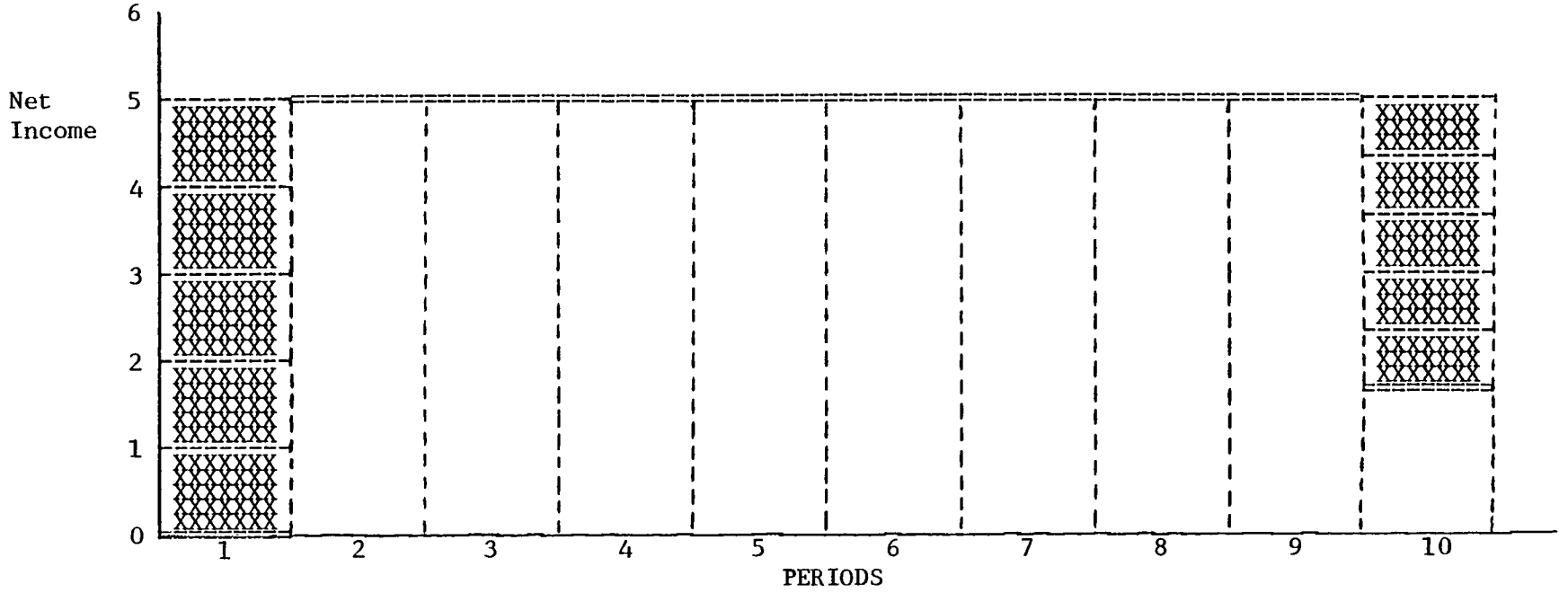
B. Bath items.

Figure 1.4. (continued)



C. Pre-smoothed income excluding bath items.

Figure 1.4. (continued)



D. Smoothed income with bath years.

Figure 1.4. (continued)

as bath items. These expenses are isolated in Figure 1.4.B., while in Figure 1.4.C., the resulting pattern of income is shown after these expenses are subtracted. By subtracting the potential bath items, the result is to increase reported income in each year by the amount of the bath items.

Now it is assumed that the company attempts to both smooth income and take financial baths. It smooths the pattern of profits in Figure 1.4.C. around the time trend of earnings (assumed constant). In addition, it treats the expenses in Figure 1.4.B. in periods one through five as a bath item in period one (a provision for expected expenses, for example), and the expenses in periods six through ten as a bath item in period ten (a write off of assets, for example). The result is shown in Figure 1.4.D. Bath periods are shown in periods one and ten and a constant income trend is shown in periods two through nine. The result is that reported income is greatly decreased in bath periods while reported income in the intervening time period is increased by the amount of the bath item not recognized during that period. Figure 1.4.D. illustrates the expected behavior of profits over time of an enterprise that both smooths income and takes baths. It has periodic bath years and smooths income during intervening time periods.

Importance of the Problem

The successful operation of the American economy is dependent on the reliability of the information used in making judgements. Information is needed by investors, creditors, and other parties in order to make economic decisions. One of the most important sources

of information is financial statements produced within the financial reporting process. Confidence in financial information is necessary if capital allocation within the economy is to be as effective and as efficient as possible (40, p. 3).

Different enterprises provide varying levels of risks and returns to investors and creditors. Since enterprises vary with respect to risks and returns, investors and creditors seek information useful in determining expected levels of risks and returns for investments. In order to properly evaluate risks and returns, investors and creditors desire financial information that enables them to differentiate between characteristics of enterprises that may be perceived as involving different risks (40, p. 4). If different characteristics that may be perceived as creating different risks are hidden, or if differences are created when there really are no differences, investors and creditors may not be able to properly evaluate risks and returns.

Recently, criticisms regarding the credibility of the financial reporting process have come to the attention of the FASB (40, pp. 4-5). Attention given these criticisms has caused some skepticism about the financial reporting process. It may be that not all of the criticisms are valid, and that even if they are, they are applicable only to a small subset of enterprises. Even so, additional research must be performed in order to establish the validity of the criticisms and to develop the information necessary to answer them. Two of the ten criticisms given are of particular interest in this project (40, pp. 4-5):

1. Companies may use reserves to artificially smooth earnings fluctuations.
2. Companies may use deferrals followed by the bath.

The financial bath and income smoothing are methods of income management. If an enterprise attempts to manage income by taking baths in periods of economic difficulties, it may also attempt to manage income in other periods by smoothing income. Again, this assumption is the foundation for this project. By dichotomizing firms into those that may attempt income management and those that may not, it can be asserted that enterprises that take baths may also have a greater tendency to smooth income than enterprises that do not take financial baths.

Research Objectives

There are two basic objectives of this study.

1. The primary objective is to evaluate the assertion that the income streams of companies in each of two possible bath company samples are smoother during the intervening periods between bath years than the income streams of companies in the control group (non-bath companies) for each of six income variables.
2. The secondary objective is to evaluate the assertion that there are significant differences between the fluctuations of certain nonincome variables for companies in each of two possible bath company samples and the fluctuations of these nonincome variables for companies in the control group for each of eight nonincome variables.

The methodology used to gather evidence to test these assertions is performed in three phases. These phases are:

1. To select a sample of 50 companies disclosing possible bath items, a sample of 50 companies which may be disguising possible bath items, and a sample of 50 non-bath companies (the control group).
2. To compute sets of dispersion-measurement values for the three samples for 14 selected financial variables using coefficients of variation and mean absolute percentage deviations of the actual changes in a variable from its trend.
3. To test the hypotheses that there are statistically significant differences between the sets of dispersion-measurement values for each of the two possible bath company samples and the sets of dispersion-measurement values for the control group for the 14 variables, as well as to test for differences between the sets of values for the two possible bath company samples for the 14 variables.

Summary of the Methodology

The population of companies to be considered for analysis in this study is limited to companies on (1) either the New York or the American stock exchanges during the period 1973-1976, and (2) listed on the Industrial Compustat tape during the period 1967-1976. For companies selected as sample members, the data analyzed is obtained from four sources. These are annual report microfiche files, Form 10-K

microfiche files, the Industrial Compustat tape, and National Automated Accounting Research System (NAARS) files. These sources are used in identifying bath companies and in testing for smoothing patterns.

Bath companies are selected by examination of financial data for companies in the population. This information is examined in two ways, called Method A and Method B, in order to identify two independent bath company samples. A control group is identified from companies not found to be Method A or Method B sample companies. After sample selection, additional tests are performed to test for smoothing patterns.

Under Method A, companies in the population disclosing specific items considered to be bath items during the period 1973-1976 are identified by utilizing the four data sources. From companies identified as bath companies, 50 are selected for further analysis. The items which may be bath items are listed in Appendix A. In general, these items are either a material write off or write down of assets, or a material provision for estimated expenses. In order for an item to be identified as a bath item in a given year, it must either reduce income before extraordinary items and discontinued operations or increase a loss before extraordinary items and discontinued operations by 10 percent or more.

Under Method B, the basic procedure is to compute a least-squares, linear regression line and a 90 percent confidence interval for each company in the population utilizing income before extraordinary items and discontinued operations for the period 1967-1976. Income

before extraordinary items and discontinued operations is the name given to one of the variables listed on the Compustat tape. As a result, this variable is referred to in this paper by this name. Any company whose income before extraordinary items and discontinued operations in any year during the period 1973-1976 falls below its lower confidence limit is identified and tested for the presence or absence of Method B selection variables (write offs or write downs of assets and/or provisions for estimated expenses of the type indicated in Appendix A, and/or extraordinary items) during the period 1967-1976.

Companies with income decreases and Method B selection variables are designated possible bath companies. The probabilities of occurrence of the possible bath year incomes for all Method B companies are computed by using t-statistics and the 50 companies with the lowest probabilities of occurrence are selected for the sample. This sample is selected with the objective of identifying companies that may be burying, and therefore disguising, bath items in aggregate financial statement categories. Since bath years may often occur during periods of large income decreases (before the bath items), selection of companies with large income decreases may have the potential to select possible bath companies.

The control group is selected from companies remaining in the population not identifed as either Method A or Method B sample members. From these companies, 50 are selected to represent non-bath companies.

Income smoothing is defined as the dampening of earnings fluctuations around a time trend of earnings. In order to dampen earnings fluctuations, the revenue and expense series must be

appropriately managed. The basic test for evidence of smoothing, therefore, is to define an expected trend and to investigate fluctuations around that trend. For purposes of this study the expected trend is defined as (1) either that produced by ordinary least-squares, linear regression techniques during the period 1967-1976 (when the regression coefficient is significant), or that produced by a mean/standard deviation model (when the regression coefficient is not significant), or (2) the mean of the absolute percentage deviations of the actual changes in a variable from its trend. Fluctuations around the trend are measured in two ways. These are either coefficients of variation (computed around the regression line if the regression coefficient is statistically significant or computed around the arithmetic mean if the coefficient is not significant) or by the mean absolute percentage deviation of the actual changes in a variable from its trend.

In order to test for significant differences in smoothing patterns between bath and non-bath companies, 14 selected aggregate enterprise time-series variables (such as revenues and primary earnings per share) are used. For each variable chosen, the set of dispersion-measurement values for the Method A bath company sample is compared to the set of values for the control group, the set of values for the Method B bath company sample is compared to the set of values for the control group, and the set of values for the Method A sample is compared to the set of values for the Method B sample. These comparisons are made independently for each of the two ways of measuring fluctuations around the trend (either coefficients of variation or the mean absolute percentage deviation of the actual

changes in a variable from its trend). These tests are also performed both before elimination of bath years and also after elimination of bath years from the time series for each variable for each company. This research design is illustrated in Table 1.1. Underlying the use of aggregate enterprise variables is the assumption that enterprises desire to disguise, rather than to disclose, any variables used to manage income. One method of disguising these variables is to bury them in aggregate financial statement categories so that their results cannot be readily discerned.

Implications of the Efficient Markets Hypothesis

There is disagreement within the financial community with respect to how risk should be measured and evaluated. The traditional view is concerned with individual business enterprises and the securities they issue (41, p. 26). The investor focuses on individual security risk and makes no attempt to separate the total risk of a company into its systematic and unsystematic components. Individual securities are studied in an attempt to identify under- and over-valued securities. This approach uses financial statements and other such information to predict future cash flows.

Portfolio theory, including the market model and the capital asset pricing model, implies that the concern should be with the risk of portfolios and not with the unsystematic risk of individual securities within the portfolio (41, p. 40). The efficient markets hypothesis (EMH) implies that all public information about a security and the firm that issued it is impounded into the security's price. Rather than analyzing specific enterprises in anticipation of earning

Table 1.1. Research design for the set of tests performed before and after elimination of bath years.

Variable	Regression or Mean/Standard Deviation Procedures	Mean Absolute Percentage Deviation Procedures
1	A ⟷ C ⟷ B	A ⟷ C ⟷ B
1	A ⟷ B	A ⟷ B
2	A ⟷ C ⟷ B	A ⟷ C ⟷ B
2	A ⟷ B	A ⟷ B
3	A ⟷ C ⟷ B	A ⟷ C ⟷ B
3	A ⟷ B	A ⟷ B
4	A ⟷ C ⟷ B	A ⟷ C ⟷ B
4	A ⟷ B	A ⟷ B
5	A ⟷ C ⟷ B	A ⟷ C ⟷ B
5	A ⟷ B	A ⟷ B
6	A ⟷ C ⟷ B	A ⟷ C ⟷ B
6	A ⟷ B	A ⟷ B
7	A ⟷ C ⟷ B	A ⟷ C ⟷ B
7	A ⟷ B	A ⟷ B
8	A ⟷ C ⟷ B	A ⟷ C ⟷ B
8	A ⟷ B	A ⟷ B
9	A ⟷ C ⟷ B	A ⟷ C ⟷ B
9	A ⟷ B	A ⟷ B
10	A ⟷ C ⟷ B	A ⟷ C ⟷ B
10	A ⟷ B	A ⟷ B
11	A ⟷ C ⟷ B	A ⟷ C ⟷ B
11	A ⟷ B	A ⟷ B
12	A ⟷ C ⟷ B	A ⟷ C ⟷ B
12	A ⟷ B	A ⟷ B
13	A ⟷ C ⟷ B	A ⟷ C ⟷ B
13	A ⟷ B	A ⟷ B
14	A ⟷ C ⟷ B	A ⟷ C ⟷ B
14	A ⟷ B	A ⟷ B

excess returns, investors should attempt to achieve an efficient portfolio by constructing a portfolio providing the highest return for a given level of risk.

The EMH is a statement of the relationship between prices and information in the securities market (35, p. 78). It concerns itself only with the prices of publicly held and traded securities and therefore is confined to only a segment of economic activity (although an important segment). For example, it excludes all nonprofit activities and closely held profit-seeking corporations and has nothing directly to say about internal (or management) accounting. In addition, the EMH does not allow conclusions to be drawn regarding either the volume of trading or the effects on individual investors (35, p. 79).

> . . . we should keep in mind that accounting data find their way into many important economic activities other than capital market decisions. The obtaining of credit, tax reporting, labor contracts and negotiations, economic research supporting governmental policy decisions, legal proceedings including (but not limited to) antitrust cases, and regulatory reporting requirements are indicative but not exhaustive of these important uses of accounting data. We do not yet know, nor has anyone investigated, the implications, if any, of the efficient market research for these decisions. We believe that reporting decisions in these areas will continue to be strongly influenced by considerations outside the boundaries of the EMH (35, p. 80).

It is important to note that the association between smoothing, the financial bath, and risk cannot be adequately tested by efficient markets methodology and portfolio theory because there is no well-specified and verified risk model with which to do so (56, p. 264). Portfolio theory does not enable such a test to be made because portfolio theory is devoid of risk specification in terms of specific firm characteristics (the firm-related determinants of market risk measures cannot be specified) (56, p. 270).

There are those who believe that it is possible to earn abnormal returns by focusing on individual security risk rather than the risk of portfolios. For example:

> Prof. Robert Kaplan, dean of the Graduate School of Industrial Administration at Carnegie-Mellon University, has done a number of studies of the effects of accounting changes on stock prices. "What we've usually found is that the market tends not to be fooled for any length of time about nonrecurring charges to earnings," he says.
>
> The length of time is, of course, the critical variable. When the market is recalcitrant, however briefly, a buying opportunity obviously arises. Instances in which an announcement of a write-off have provided such an opportunity are plentiful. Investors have days, weeks, or sometimes even months to take advantage of a potential earnings surge.
>
> So the next time you read that a write-off has cast a cloud over a company's earnings, don't overlook the possible silver lining (55, p. 36).

If it is assumed that capital markets are efficient, however, there is an implication that can be drawn from this body of knowledge that is important to this study.

> Advocates . . . contend that evidence indicates that the market is quite sophisticated in reflecting information. For example, the market is not tricked or fooled by accounting changes that increase reported earnings but have no economic effect on the enterprise nor is it fooled by an arbitrary choice of an alternative accounting method as long as information is available about the effect of the choice (41, p. 40).

The implication of this conclusion is that discretionary accounting variables and nonaccounting variables used for smoothing and financial bath activities which must be disclosed will not affect the risk-return evaluations of investors and creditors in the manner deemed desirable to management since their effect can be readily discerned. Only those variables which do not have to be disclosed and whose results can be buried, and thus disguised, in aggregate financial statement categories are capable of affecting the perceptions of

investors and creditors in the desired manner. This consideration is important in the development of the Method B bath company sample discussed in Chapter III.

Contribution of the Study

The contribution of this study is in the broad area of financial accounting theory. In particular, the study deals with two practices which may be used by enterprises to manage reported accounting income.

Research in the area of income management has the potential to provide insights useful in development of accounting theory and practice. A clearer delineation of the structure of the population of income management methods leads to greater understanding of the interrelationships and interdependencies involved. Increased knowledge of the properties of accounting income is important since it may contribute to the development of improved model-building techniques in the fields of accounting and finance. For example, Beaver (14, p. 64) compiled a list of studies requiring assumptions about the time-series properties of accounting income. These studies include valuation models of the firm, valuation of firm securities, dividend policies, earnings growth rate forecasts, evaluation of the informational content of accounting numbers, forecasting the failure of firms, industrial concentration, and accounting rates of return.

Results of such research are of interest to four groups. These groups are those persons responsible for determination of accounting standards, those persons utilizing financial statements as inputs for economic decision-making, auditors, and those persons performing research in the field of accounting.

The FASB has responsibility for determination of standards. It has noted that the profession is receiving criticism concerning financial bath write offs and the use of reserves to artificially smooth income. Before corrective actions can or should be taken, and before critics can be answered, evidence must be gathered establishing the validity of these criticisms. Only then can a response be formulated. This project, while not establishing whether these criticisms are valid, does provide some input into the decision-making process; it indicates whether there is evidence to sustain the assertion that some firms attempt to use both bath and income smoothing techniques to manage income.

Users of financial statements (such as investors, creditors, and financial analysts) desire to predict expected risks and returns of enterprises in order to make economic decisions and recommendations. They desire to be aware of any factors creating differences in enterprises and their circumstances. Since both income smoothing and financial baths may create artificial differences between enterprise financial statements, sophisticated users must be aware of possible effects if they are to make the best decisions possible. Lack of knowledge may lead to suboptimal decisions that involve a cost to society.

Auditors desire to determine whether the financial statements of an enterprise fairly present its financial position, the changes in its financial position, and the results of its operations in conformity with generally accepted accounting principles. In addition, they desire to determine whether these principles are applied on a basis consistent with that of the preceding year. As a result, they

desire to be aware of any factors that may affect the fairness and the consistency of a firm's financial statements. Since the financial bath and income smoothing may involve discretionary management actions, the auditor may attempt to limit management's use of these activities in order to obtain less-biased financial information even though generally accepted accounting principles may permit these practices.

The study is also of interest to researchers. First, it provides additional evidence that builds on the results of previous studies of the bath and the conditions under which it commonly occurs. Second, it extends testing procedures for smoothing patterns by using coefficients of variation and aggregate enterprise financial variables. Last, the results indicate the relationship of the bath and smoothing as methods of income management. Researchers interested in performing further work in these areas will have additional information as to the proper methodology to use and the structure of the population to which that methodology should be applied.

Organization of the Study

In order to place the study in a logical framework, the following format is used to develop the research area of interest, the methodology used, and the results and conclusions of the study. Chapter I identifies the general nature of the problem and the objectives of the study. The importance of the problem and the expected contribution of the project are also discussed.

Chapter II provides a review of previous work in the areas of interest. In particular, studies dealing with the financial bath, income smoothing, and the time-series properties of accounting income

are discussed. This chapter describes what has been done in other studies and indicates the relationship of this project to past research.

Next, Chapter III describes the methodology used in the study. A detailed review is provided of the steps undertaken to develop the two independent bath company samples and the control group, as well as to test these samples for smoothing patterns.

The last two chapters summarize the results and the conclusions. Chapter IV presents the hypotheses tested, the methods of analysis of the data obtained during the study, and the results. Chapter V summarizes the project by presenting the conclusions reached, the limitations of the study, and the opportunities for future research in this area.

CHAPTER II

REVIEW OF RELATED LITERATURE

In Chapter I it is asserted that companies utilizing the financial bath technique in certain years may also tend to utilize smoothing techniques during intervening time periods to a greater extent than companies that do not use the financial bath technique. The primary objective of this study is to provide empirical evidence in support of this assertion by comparing specific properties of certain aggregate financial variables for a sample of bath and non-bath companies.

Chapter II presents a review of research efforts in areas related to this study. Discussions in this chapter are organized and presented in three major sections. These sections are (1) studies dealing with the financial bath, (2) studies dealing with the income smoothing hypothesis, and (3) studies dealing with the time-series properties of reported accounting income. These studies are reviewed in order to explain the nature and the extent of research that has been performed by researchers in each area as well as to discuss conclusions reached. At the end of this chapter the findings from this review are summarized.

A review of earlier research efforts must be performed as a part of any major study. This review is necessary if the researcher is to identify the strengths and weaknesses of the work of other researchers and to incorporate the results of this review into his own work. Studies pertaining to the three topics investigated in this

chapter were conducted using a great diversity of research approaches and methodological procedures. As a result, some prior studies are more relevant with respect to the objectives of this project than others and accordingly are reviewed in detail, while other studies of interest are only briefly mentioned.

The Financial Bath

Moore

The financial bath has received little attention by researchers. The major empirical study concerning the bath and the conditions under which it commonly occurs was performed by Moore (63). Moore defines a financial bath as the interface of a set of independent and dependent variables. The independent variables are:

1. a significant decline in income or a loss,
2. a significant decline in the market price of common stock, and
3. a management change.

The dependent variables are:

1. write downs or write offs of assets,
2. provisions for future estimated expenses or losses, and
3. changes in accounting principles.

A bath company is defined as a company which has one or more of the dependent variables as well as one or more of the independent variables (63, pp. 5-6).

The hypotheses tested are as follows (63, p. 5):

I. Material extraordinary losses are likely to be recognized in a period of a significant decline in income of a company.

II. Material extraordinary losses are likely to be recognized in a period of a significant market price decline of a company's common stock.
III. Material extraordinary losses are likely to be recognized after a change in management of a company.

The hypotheses are not mutually exclusive since there are interactions between them.

The Moore study examines the bath using two methods called Method A and Method B. Under Method A the independent variables are tested in order to examine the three hypotheses. To test the first hypothesis, a distribution of t-statistics is statistically compared to a distribution of extraordinary losses for a sample of companies selected from Industrial Compustat tapes. The second hypothesis is tested in a similar manner. A distribution of stock price movements is statistically compared to a distribution of extraordinary losses for companies selected from Industrial Compustat tapes. The third hypothesis is tested by identifying companies with significant management changes and testing to determine if there is a relationship between extraordinary losses and management changes (63, pp. 7-9).

Method B examines the bath by fixing the dependent variables and testing their relationship with the independent variables. An examination is made of approximately 3,200 annual reports to stockholders representing about 900 companies in order to determine which companies have one or more dependent variables. Alternative procedures are applied to test the three hypotheses (63, pp. 9-10).

Mixed results are obtained in the analysis of data (63, p. 110). Strong support is found for the first hypothesis; the statistical tests indicate that material extraordinary losses are more likely to be recognized in a period of significant decline in income. In addition,

strong support is found for the third hypothesis in that the tests indicate that material extraordinary losses are more likely to be recognized after a change in management. The second hypothesis, however, receives little support. It cannot be concluded that material extraordinary losses are more likely to be recognized in a period of significant decline in the market price of a company's common stock.

The major limitation occurs as a result of the difficulty of identification of bath items, a problem arising in the Moore study as well as in any study of the bath. First of all, bath items may be buried in aggregate statement categories, included in the computation of income before extraordinary items, and may not be disclosed separately. Second, positive and negative bath items may be netted against each other and against other items arising within the firm and again not be disclosed. If not disclosed, bath items (and bath companies) are difficult to identify. Last, it is often difficult to determine whether items disclosed in financial statements are bath or non-bath items. This determination depends on the criteria employed and the judgement of the reviewer.

Other limitations are also present in the Moore study. Tests under Method A are conducted using distributions of material extraordinary losses rather than distributions of bath items. In addition, there may be interactions among the three hypotheses of an unknown nature. The samples are not random and there is overlap between them. Last, the requirement that a bath company have one or more of the dependent variables as well as one or more of the independent variables may be too stringent.

Copeland and Moore

An article on the financial bath was published by Copeland and Moore (CM) (30). The CM study uses the data upon which the study by Moore is based. The research approach is similar to the Method B approach in the Moore study in that 3,761 annual reports for 907 companies are obtained and analyzed. Bath companies in this study are identified as those which have certain discretionary accounting decisions that reduce income or increase a loss before these decisions by 10 percent or more (30, p. 64). A control group of 100 companies is selected from the companies not identified as bath companies.

The hypotheses tested are (30, p. 65):

1. When companies make discretionary accounting decisions, the movement of their incomes (before discretionary accounting decisions) relative to prior years' income are no different than the year to year income movements of companies selected at random that did not have discretionary accounting decisions.
2. When companies make discretionary accounting decisions, the proportion incurring losses before these decisions is no different from the proportion of companies incurring losses in a random sample that did not have discretionary accounting decisions.
3. When companies make discretionary accounting decisions, the movements of their stock prices relative to prior year-end prices are no different than the year to year price movements of companies selected at random that made no discretionary accounting decisions.

The hypotheses are tested by use of Chi-square statistics and Mann-Whitney U tests. Absolute percentage changes in income and stock price movements are calculated for both samples and bath companies are compared to the control group.

The conclusions reached are that there is a significant relationship between both income declines or management changes and discretionary accounting decisions, but the bath does not appear to

be related to stock price declines (30, p. 68). The authors indicate that the bath does exist, but that it is not as widespread as some observers have estimated.

The current study utilizes an approach similar to that of the CM study; a bath company is defined as one having material write offs and/or write downs of certain kinds of assets and/or material provisions for future estimated expenses. The problems associated with identification of bath items discussed earlier, however, are present in the current study as well as in the Moore and the CM studies since little can be done to correct these difficulties.

The Moore and the CM studies leave many questions regarding the financial bath unanswered. As a result of unresolved issues, additional work is needed in this area. The current study contributes to understanding of the financial bath by indicating whether there is evidence to sustain the assertion that enterprises that use the financial bath also tend to be income smoothers. While the current study is limited to an investigation of this relationship, other research questions remain. For example, evidence can be gathered to determine whether firms that take baths tend to have certain distinctive characteristics and how often they tend to take baths. In addition, the relationship between the bath and stock prices can be investigated by using the methodology associated with the efficient markets hypothesis and portfolio theory.

Income Smoothing

The income smoothing hypothesis has received considerable attention. Studies in this area have utilized many different

approaches, and it is the purpose of this section to summarize the important studies in order to emphasize the accounting variables that have been investigated and the diverse methodologies that have been employed by other researchers.

Despite the extensive work performed, it is quite evident that the issue is largely unresolved, perhaps due to methodological limitations. The two basic methodological approaches have been (1) smoothed/unsmoothed comparisons, and (2) correlation tests between changes in accounting practices and enterprise performance levels. In the first approach tests are performed to determine if the inclusion of a potential smoothing variable produces a smoother earnings stream. In the second approach it is determined whether companies with declining earnings tend to attempt to improve profits with the smoothing variables and vice versa.

Management of the earnings stream through smoothing activities is first mentioned in 1953 by Samuel R. Hepworth in an article entitled "Smoothing Reported Income" (48). Hepworth notes that ". . . considerable latitude exists within the confines of 'generally accepted accounting principles' in the determination of periodic earnings" (48, p. 32). Hepworth surveys some of the accounting techniques which may be used in determining periodic net income. Emphasis is placed on techniques for reducing the fluctuations in net income, but no empirical test is performed. No further work is performed in this area until 1964 when Gordon completes a more rigorous development of Hepworth's concept (45).

Gordon, Horwitz, and Myers

In 1966 Gordon, Horwitz, and Myers (GHM) perform the first empirical study of the smoothing hypothesis (46). The purpose of their study is (1) to perform a time-series analysis of all discretionary accounting variable choices made by the management of United States Steel Corporation during the period 1952-1963, and (2) to test the behavior of a sample of 21 firms chosen from the chemical industry with respect to their treatment of the investment credit.

For the United States Steel Corporation, five changes in accounting decision rules are examined. The implementation of these accounting changes is analyzed to determine if they consistently increase or decrease the rate of growth in income. The researchers are unable to find any consistent pattern (46, pp. 229-230).

The sample of firms in the chemical industry is examined by determining how each company reports the investment credit (flow-through method or cost reduction method), and by determining whether firm income is above or below normal income (46, p. 225). Normal income (smoothed income) is developed by use of a first-order exponential smoothing model in which alpha is arbitrarily assumed to be 0.3. The results are not supportive of the smoothing hypothesis, perhaps due to methodological limitations.

The GHM study has several limitations. First, only one possible smoothing variable is analyzed in depth and the size of the sample is small and limited to one industry. Next, the main mathematical tool used is a double exponential smoothing model with an arbitrary weighting factor. This model may introduce as much error as it eliminates, producing inconsistent results.

Dopuch and Drake

Dopuch and Drake (DD) (33) examine the manipulative potential of investment income. They analyze 11 firms during the period 1955-1964, which was before the issuance of Accounting Principles Board Opinion No. 18 in 1971. During this period firms were able to choose the timing of the recognition of the difference between cost and market value of securities by their sale, and they were able to determine to some extent the amount of dividends declared by the company whose securities were owned. DD plot total income and income from noninvestment activities for each company during the time period. These lines are analyzed for apparent smoothing activities by examining dispersion around the total income line and dispersion around the noninvestment income line.

DD conclude that of the two types of investment income, dividend income is more effective as a smoothing device than gains and losses from the sale of investments. Investment income does not result in large changes in reported income, although some evidence of smoothing is found (33, pp. 205-206). In general, the results do not support the smoothing hypothesis. Weaknesses of the DD study are that the sample size is small, just one accounting variable is investigated, and the only statistical technique used is a scattergram which is subjectively evaluated.

Copeland and Licastro

Copeland and Licastro (CL) (29) look at the smoothing potential of dividends received from unconsolidated subsidiaries and reported by the parent using the cost method. A sample of 350 firms is

randomly selected during the period 1954-1965 and the financial data examined to determine which of these companies have unconsolidated subsidiaries reported on the cost basis. In addition, it is determined which companies disclose dividends received from subsidiaries and which have data available for a long period of time. Twenty firms meet these criteria.

Reported income is divided into operating income and dividends. To test the hypothesis that the sample companies do not attempt to smooth income by regulating subsidiary dividends, the annual change in dividend income is compared to the annual change in operating income (29, p. 542). Smoothing would result in positive (negative) changes in operating income being associated with negative (positive) changes in dividend income.

The null hypothesis cannot be rejected since a significant positive relationship is found. CL note that only firms disclosing the needed information are included in their sample (29. p. 544). Disclosure may indicate that the variable is not being used for smoothing purposes. As in previous studies, only one accounting variable is analyzed.

White

White (84) selects 42 firms in the chemical industry and 54 firms in the building materials industry for analysis. Four samples of firms are selected from these firms. First, 10 companies are randomly selected from each of the two industry groups. Remaining firms are ranked according to the degree of smoothness in their

earnings per share (EPS) trends over the period 1957-1966 and the 10 firms exhibiting the highest degree of smoothness in each industry are used to form two additional samples (84, p. 261).

EPS is selected as the surrogate for reported performance due to its importance. For each company, all reported discretionary decisions (with respect to the financial accounting framework) are identified and their marginal effect on EPS is calculated. The degree of smoothing (or nonsmoothing) in each year is calculated by comparing the net marginal effect of the discretionary accounting decisions to the difference between actual EPS and the predicted EPS (84, p. 264). A set of rules is used to evaluate whether smoothing is or is not evident.

The results indicate that overall there is no evidence that companies in the samples significantly achieve their EPS trends through the choice of their accounting alternatives (84, p. 270). It is suggested that the smooth trends are achieved by chance and/or variables other than those included in the study.

Cushing

The results of the income smoothing studies discussed so far in this section do not provide support for the income smoothing hypothesis. Some studies, however, have been performed that are considered by the researchers to support the hypothesis. Cushing (31) conducted a study of the effects of changes in accounting policy on reported income for a large number of firms. He reviews Accounting Trends and Techniques during the period 1955-1966 to identify all companies with consistency qualifications due to changes in accounting

policy; 666 qualified reports are identified, representing 580 firms. From this set of 666 reports, 325 cases are considered material and are divided into two groups by relative materiality. The first group consists of 75 changes for which the effect is less than 10 percent of reported EPS and less than 50 percent of the change in EPS relative to the prior year. Remaining changes are put in the second group (31, pp. 200-201). Cushing concludes that 167 (out of 249) changes of the group with highest defined materiality and 30 (out of 78) of the other group are consistent with the smoothing hypothesis (31, pp. 201-202). Chi-square statistics are used to test the two groups for differences in smoothing and nonsmoothing patterns. Cushing concludes that managements choose the periods in which accounting changes occur as long as the effects on earnings are material, while other changes (not material) receive less attention (31, p. 203).

Dascher and Malcolm

Dascher and Malcolm (DM) (32) analyze 52 firms in the chemical industry by looking at four accounting variables. These are (1) pension costs, (2) dividends from subsidiaries, (3) extraordinary items, and (4) research and developement costs (32, p. 254). In order to test for smoothing patterns, the researchers fit an exponential curve to reported income and to income computed by excluding the four variables.

Fluctuations around the trend are measured by the standard deviation of the estimate (SDE). A smoothing ratio is computed by dividing the SDE of the income computed by excluding the four variables by the SDE of the reported income. A smoothing ratio

greater than 1.0 is hypothesized to represent smoothing behavior. The researchers feel that in the absence of smoothing attempts, the number of ratios less than one should equal the number of ratios greater than one.

Two time periods (6- and 11-years) are utilized. For the 11-year period, 35 firms have smoothing ratios greater than one, while 17 firms have smoothing ratios less than one. For the 6-year period, there are 40 smoothing ratios greater than one and 12 less than one. The researchers, therefore, feel that their results are consistent with the smoothing hypothesis (32, p. 258).

Beidleman

Beidleman (17) tests the hypothesis that management is successful in its attempts to smooth or partially normalize the time trend of earnings (17, p. 659). The methodology is based on time-series regression models. First, a linear regression model is calculated by regressing reported income against time for each sample company. Next, for six possible smoothing variables for each company, a linear model is calculated for each of the variables. Then the residuals from the time-series regressions of earnings are correlated with the residuals from the time-series regressions of the six possible smoothing variables. In periods when smoothing takes place, it is hypothesized that residuals from the time trends of earnings and those from the time trends of discretionary expenses are positively correlated, while the residuals from the time trends of earnings and those from the time trends of discretionary revenues are negatively correlated (17, p. 659).

Beidleman finds mixed results but concludes that sample firms employ certain discretionary variables to normalize reported earnings. He also concludes that not all firms engage in smoothing nor do firms use every chance they get to smooth reported income (17, p. 666).

Beidleman's study has several limitations. First, in order to be selected, sample firms must have disclosed the smoothing variables. As Beidleman indicates, the disclosure of discretionary variables may indicate that the firm is not seriously engaged in smoothing, or that, if it is, it is not sensitive about disclosing these variables. Firms not disclosing discretionary accounting data may be those concealing something (17, p. 661). The subset of firms disclosing the variables is quite small, and it cannot be determined whether this biases the results. Last, the methodology does not allow for the possibility that firms may attempt to smooth, but may make too large an adjustment and produce counter-smoothing.

Imhoff

Imhoff (51) discusses additional important limitations of Beidleman's study. First, he questions whether it can be said that smoothing is a defendable goal for external reporting purposes in that it reduces uncertainty and makes investment in a smoothing firm more attractive (51, p. 118). He indicates that the relationship between reported earnings for a firm, return on investment in the firm, and return on the market portfolio is not clear and this assumption may not be valid. Next, he indicates that the methodology ignores the possibility that above-trend income residuals may

normally be associated with above-trend expense residuals since variable expenses, by definition, vary relative to changes in sales (51, p. 120). Last, he indicates that the assumption that all firms with significantly strong correlations between paired residuals are smoothing firms may not be valid.

Lev and Kunitzky

Lev and Kunitzky (LK) (56) explore the relationship between measures of smoothness of various input and output series and measures of risk by use of cross-sectional least-squares regressions. Their objective is to draw attention to certain financial statement measures which reflect basic risk characteristics of the firm according to organization and production theorists. In particular, they suggest that firms smooth various input and output series in order to decrease environmental uncertainty. If this argument is valid, the volatility of such series should be associated with market-determined risk measures (56, p. 259).

The association between smoothing and the risk of common stocks is measured by use of the mean/standard deviation portfolio model (56, p. 262). The two measures of risk considered are (1) the overall riskiness of the stock as measured by the standard deviation of periodic stock returns, and (2) the systematic risk of the stock associated with general economic changes affecting all stocks. In order to measure smoothness of selected variables, the mean absolute percentage deviation of the actual changes in a variable from its trend is selected (56, p. 263).

The variables tested for smoothing patterns fall into two basic groups. The first group is designed to reflect a wide variety of managerial decisions. These decisions deal with production, investment, and financing activities of the firm. The second group consists of accounting-based variables found previously to be associated with risk. The variables are cross-sectionally correlated with the two common stock risk measures by means of ordinary least-squares regressions. The two risk measures are treated as dependent variables, while the other measures are treated as independent variables. Various combinations of smoothing variables are used as independent variables (56, pp. 263-265).

The authors conclude that when the income variability is accounted for by use of the mean absolute percentage deviation, it is significantly correlated with both the overall and the systematic risk measures (56, p. 268). In addition, a significant association is found between the smoothing measures for sales, dividends, and capital expenditures and both risk measures. The signs of all the smoothing coefficients are in the expected direction in that the greater the smoothing measure, the higher the risk.

The current study draws upon the methodology and results of the LK study. First, the smoothing measure used in the LK study (the mean absolute percentage deviation of the actual changes in a variable from its trend) is also used in the current study as one of the two ways for measuring fluctuations around the trend. Next, the LK study investigates the accounting smoothing characteristics of non-income series. The current study incorporates nonincome series in

the tests for smoothing patterns by using such variables as production, the current ratio, and the capital expenditures ratio, as well as income series.

Barnea, Ronen, and Sadan

Barnea, Ronen, and Sadan (BRS) (10) test whether extraordinary gains and losses are used to smooth ordinary or operating income over time. They feel that the emphasis in past smoothing studies is on net income (after extraordinary items), but for users of financial statements, the focal point is ordinary income (before extraordinary items) and this should be the object of smoothing attempts. If management desires to produce a smoother ordinary income stream, it can use its discretion in the classification of nonrecurring items to achieve this objective. The BRS study, therefore, makes the distinction between classificatory smoothing and nonclassificatory smoothing (10, pp. 110-111).

The methodology used is similar to that developed by Beidleman (17). The objects of smoothing are considered to be ordinary income before extraordinary items per share, and operating income before period charges and extraordinary items per share (10, p. 113). BRS detrend these two smoothed variables for a period of 20 years by regressing the variables against both time and the industry leader's (greatest share of revenues) smoothed variables. The deviations of these variables from their trends and the deviations of the reported extraordinary items from their trends (assumed constant) are computed. The deviations of extraordinary items are regressed on the deviations of the smoothed variables. It is hypothesized that smoothing is

indicated if above-trend smoothed variable is associated with above-trend extraordinary gain or below-trend extraordinary loss, or vice versa (10, p. 115).

BRS conclude that their results support the classificatory smoothing hypothesis with respect to extraordinary items (10, p. 118). They emphasize, however, the importance of the development of the conceptual framework for the tested hypothesis and the methodology. If they had been testing for nonclassificatory smoothing rather than classificatory smoothing, they would have observed counter-smoothing behavior.

Gibbens

Gibbens (42) discusses the BRS paper in a later comment. He indicates that correlation-based income smoothing research is inadequate if management's intentions to smooth are not established independently. Such research is performed on the income statement as it exists after any smoothing and requires an assumption of no counter-smoothing behavior. He points out that any established correlation, positive or negative, of extraordinary items with either ordinary or net income figures would point to possible smoothing behavior, but of different kinds (classificatory or non-classificatory). He asks whether, since this is true, any correlation is evidence, by itself, of management intentions to smooth. In addition, he questions whether the frequency of occurrence of non-recurring items is sufficient to justify the use of residuals to test the smoothing hypothesis.

Smith

Smith (77) contributes to the smoothing literature by making a distinction between enterprises which are controlled by their owners and those which are controlled by managers. He argues that firms controlled by managers rather than owners should have a smoother income stream and examines the effect that the type of control has on the pattern in which accounting policy decisions are made (77, p. 707).

Smith's study is an empirical investigation of the policy decisions made by 110 firms during the period 1954-1962. Out of this sample, 57 firms are considered to be manager-controlled and 53 firms are considered to be owner-controlled. Control is defined in terms of ownership of voting stock (77, p. 712).

Investigation of smoothing behavior is performed through the use of EPS as a surrogate for management performance. Five goal income models are defined in terms of EPS in order to determine normal income for each given firm in a given year. Policy decisions of interest are changes in accounting principles requiring consistency exceptions, accounting changes necessitated by changed conditions, and extraordinary gains and losses. Each of these policy decisions is classified as a smoothing or nonsmoothing change using each of the five goal income models. When preliminary income (before any accounting manipulation) is less (more) than the goal, an accounting variable is said to be a smoothing variable if it increases (decreases) reported earnings (77, p. 715).

The results indicate that the tendency to use accounting policy decisions to smooth income is dependent on the type of control. The policy decisions made by manager-controlled firms smooth income more often than the policy decisions made by owner-controlled firms.

The Time-Series Properties of Income

Studies relating to the income smoothing hypothesis are discussed in the previous section. It is shown that the subject has received much attention and that a great diversity of approaches have been used. These studies have generally attempted to determine whether enterprises do actually smooth income numbers, and if so, which firms tend to smooth income. In addition, various accounting variables have been investigated to determine the relative smoothing potential of these variables. In this section another type of study is reviewed. These studies deal with the nature of income generating processes in an attempt to determine the conditions under which smoothing actions would be effective.

The time-series behavior of reported enterprise earnings has received considerable attention. The first major work by Little (58) met with widespread disbelief. Little studied the earnings of British firms and concludes that changes in earnings, like changes in stock prices, follow a random walk. Successive changes in earnings per share are found to be statistically independent, which indicates that the study of historical changes in earnings per share provides no useful information in predicting future changes.

Little's work received much criticism after its introduction. He responded by revising his study with the help of Rayner in order to meet previous criticisms (59). Both of these studies use percentage changes in incomes to measure growth rates and are concerned with the stability of these rates from period to period. The conclusions, however, are still the same. Earnings for British companies are found to follow a random walk.

In response to this work, Murphy (65), Lintner and Glauber (57), and Brealey (24) studied changes in earnings for American corporations. Lintner and Glauber look at the relationship between growth rates from period to period. They use logarithmic data and measure growth as the slope coefficients of the regressions of certain income variables (such as operating income and earnings per share) over 5- and 10-year periods. They find very small cross-sectional correlation between growth rates. Brealey investigates changes in incomes rather than growth rates in incomes. He computes cross-sectional correlations of changes in incomes for various lags, runs tests, and financial analysts' predictions based on historical accounting data. It was felt that the reliability and accuracy of British accounting information was quite low due to a lack of quality of British accounting standards and that studies of the changes in earnings of American firms would produce entirely different results. The results, however, are the same; changes in the earnings of American firms are also found to follow a random walk pattern.

Ball and Watts

More recent studies have produced similar results. Ball and Watts (BW) (7) apply different methods from those of previous researchers (i.e., they do not use cross-sectional correlation), but reach the same general conclusions. They conclude that reported annual accounting incomes for U.S. corporations in general follow either a submartingale or very similar process (the term submartingale includes a martingale process) (7, p. 663).

The BW study is essentially a descriptive process and uses a variety of different tests in order not to impose restrictive assumptions (7, p. 667). The analysis is limited to the expectations of probability distributions of changes and ignores other distributional features. Four definitions of income are used. They are (1) net income after income taxes, (2) earnings per share adjusted for stock splits and dividends, (3) net income deflated by total assets, and (4) net sales. These variables are subjected to a variety of tests which include tests of average changes, runs tests, tests of serial correlation, tests of mean squared successive differences, and tests of partial adjustment models.

The results are that deflated net income and earnings per share are found to be described by a martingale series, while net income is found to be described by a submartingale with a linear trend. In addition, sales is found to be described by a submartingale with a linear trend. The general conclusion is that income can be characterized on average as a submartingale (which includes the martingale process) or some similar process (7, p. 680).

Gonedes

Gonedes (43), while not providing empirical evidence, does provide a framework for clarifying and testing a form of the income smoothing hypothesis. The form considered is a rate of return version. Gonedes deals with the optimality of smoothing actions by trying to establish the conditions under which smoothing actions are optimal (43, p. 571).

The study deals with two classes of stochastic processes considered with respect to rates of return. These are martingale and mean reverting processes. To test these stochastic processes, a description of the expected optimal smoothing actions for an N-period horizon is developed by use of dynamic programming techniques. This procedure enables the development of several propositions regarding optimal smoothing actions for each kind of stochastic process and at various stages within the N-period horizon.

The general conclusion is that income smoothing actions of the kind generally hypothesized appear to be optimal. If "bad times" are followed by "good times," the optimal smoothing action is to reduce the extent to which bad times and good times (at the other extreme) are reported (43, pp. 583-584).

Lookabill

Lookabill (60) also provides additional evidence regarding the time-series properties of accounting earnings (60. p. 725). He attempts to provide evidence by controlling for risk characteristics in order to resolve the results of an earlier study by Beaver (14)

and the study by Ball and Watts (7). Beaver concludes that the time-series process best describing earnings is a moving average model in which the underlying process is mean reverting (14, p. 86). BW conclude that the best process is a submartingale process or some similar process (7, p. 680).

Lookabill uses a modified High-Low test in which sample members (65 firms) are ranked by accounting return and split into two groups. Firms with above median returns are put in the high group and the remaining firms are put in the low group. In following periods the return on each group is plotted. If the difference in average return for the two groups remains the same in following periods as in the initial period, the process describing the generation of earnings is a submartingale. If the difference narrows in following periods and eventually reaches zero, the process is a moving average process.

If the reported accounting earnings are a reflection of risk differences, then mean reversion of a firm's betas could lead to mean reversion in the rate of return. This process would produce a time series which could be described by a moving average process (60, p. 728). Ranking firms by return could be the same as ranking firms by risk as long as earnings reflect differences in risk across firms.

The main conclusion is that the observed moving average properties of the deflated accounting earnings series are not caused by mean reversion in market betas (60, p. 736). Therefore, changes in risk levels apparently do not explain the conclusion of Beaver that deflated earnings series are described by a moving average model in which the underlying process is mean reverting. By excluding this

explanation, the conclusion is reached that the historical cost accounting system (as well as, perhaps, managerial manipulation) produces averaging in the accounting series which results in a moving average model best describing the generation process (60, p. 736).

Brooks and Buckmaster

Brooks and Buckmaster (BB) (26) attempt to identify the conditions under which income time series do not follow a submartingale process (26, p. 1359). They assume that the basic underlying earnings generation process is best fitted by a submartingale or some similar model, but that conditions may exist under which a different model best fits the data. Their approach is to stratify the sample by using the distance of a given observation from a defined normal income for each company. Three stratification rules are used to develop the strata and each stratum is tested by determining the best exponential smoothing model and smoothing constant.

After stratification by each of the three rules, first, second, and third order exponential smoothing models are applied to the members of each stratum to determine the smoothing constant that produces the best predictor model. The best predictor model is defined as the one that minimizes the error between the predicted income and the actual income. Two measures are used to determine the error. These two measures are the mean absolute error and the standard error of the estimate. The income variable used in these tests is net income after both taxes and all extraordinary items.

The results suggest three properties of income time series of interest to other parties (26, pp. 1370-1371). First, it is indicated that for the entire group of tests performed, the best predictor model has a smoothing constant of one. This result suggests that income time series in general follow a submartingale or similar process, as indicated by Ball and Watts (7). However, the second property is that time series falling in the outer strata have a best smoothing constant of less than one when predicting income in the period following the stratification period for all stratification rules and error measures used. There is some indication, therefore, that a substantial subset of income time series do not follow a submartingale process. Last, the results indicate that income tends to revert to previous levels in the period following a substantial deviation in actual income from normal income.

BB extend the scope of this research in a later project through further investigation of income time series in the outer strata (25). The methodology used in the second BB study is similar to that used in the first study. Stratification is accomplished by use of the third rule from the first study. Determination of the best predictor model for the strata developed through this procedure is accomplished by using first, second, and third order exponential smoothing models and determining the smoothing constant which minimizes the mean absolute error between actual income and predicted income. In the second BB study net income after extraordinary items is not used as the income measure. Instead, the four measures used are ordinary annual income, ordinary income per share, annual net income available to common stockholders, and net income per share.

The second BB study is designed to determine the time-series generating process for the non-martingale subsets and to gather evidence regarding the frequency of a martingale process. The conclusions are basically the same as those drawn in the first BB study (25, pp. 24-25). Random walk and random walk with drift processes are found to be the dominant type of processes explaining the time-series properties of an unpartitioned set of firm income data. In addition, for a partitioned set of income data, the most likely process is a random walk process. However, moving average and mean reverting processes do occur systematically for many of the partitioned observations. For firms with decreases in income, the most likely process is a time dependent moving average or mean reverting process.

Watts and Leftwich

Watts and Leftwich (WL) (82) investigate whether the use of Box-Jenkins techniques (23) applied to observations of annual earnings produce estimates of income generating processes for individual firms that outpredict a random walk model (82, p. 255). The sample consists of firms in the railroads, petroleum, and metals industries. The income measure used is earnings available for common stockholders.

The hypotheses tested are that the estimated parameters for each model in each period differ from those of a random walk model. The null hypothesis, therefore, is that the estimated parameters of the estimated model are the same as those for a random walk model (82, p. 258).

Tests of the hypotheses using F-statistics indicate that the earnings of all firms do not follow a random walk (82, p. 263). It is difficult, however, to interpret the result that about half of the estimated processes are inconsistent with a random walk, since this inference depends on the extent to which the assumptions of the Box-Jenkins technique are met. The researchers, therefore, test to determine if the assumptions are met. Their conclusion is that if normality of the residuals is assumed, the residual variance is not stationary (due to structural change) and that no method is available to adjust the series to correct this misspecification (82, p. 266).

Since the Box-Jenkins models are misspecified, the relative predictive ability of the identified and estimated models are compared to a random walk model. Three criteria are used for describing predictive ability and are applied separately to each of four forecast periods (82, p. 259). The results are mixed and no set of models appears dominant (82, p. 266). It appears that the parameters of the identified and estimated models are nonstationary and that no confidence can be placed in the statistical tests indicating that the parameters of the Box-Jenkins models are different from those of a random walk.

Albrecht, Lookabill, and McKeown

Albrecht, Lookabill, and McKeown (ALM) (1) perform additional work on the time-series properties of income similar to that of Watts and Leftwich (82). They desire to gather additional evidence sufficient to indicate whether the results of WL are due to sampling error or whether differences do exist in time-series properties

between specific firms and industries (1, p. 227). ALM examine both deflated (earnings available to common stockholders divided by stockholders' equity) and nondeflated (earnings available to common stockholders) earnings streams and use both a cross-sectional analysis and an analysis of specific firm time-series processes. For the cross-sectional approach, autocorrelations at eight different time lags are examined. For the firm-specific approach, the techniques of Box-Jenkins are used. In addition, forecasts made using the Box-Jenkins procedures are compared against forecasts made from a random walk model and a random walk model with drift.

The results are similar to those of WL. Both the cross-sectional and the firm-specific analyses indicate that a general representative firm model performs as well as the estimated Box-Jenkins models in describing the time-series properties of sample members (1, p. 242). It appears, however, that the general model to be used is dependent on the data being studied. For the nondeflated series, a random walk model with drift performs better than a strict random walk model, while for the deflated series a strict random walk model appears best. Little difference is found between the predictive ability of the estimated Box-Jenkins models and that of the best random walk model.

Summary

A review of research related to the current study is presented in this chapter. The literature reviewed is organized and presented in three sections dealing with the financial bath, income smoothing, and the time-series properties of accounting income. There has been

little work relating to the financial bath. However, considerable work has been performed in the area of income smoothing and in the area of the time-series properties of accounting income. Despite the research performed in these areas, the issues remain largely unresolved and additional work is needed. The current study contributes to this body of knowledge by investigating the relationship of the financial bath and income smoothing. No research has yet investigated this relationship and such a project has the potential to provide useful insights.

The research performed in these areas has taken different forms. The major empirical study performed on the financial bath develops a definition of the bath and investigates the conditions under which it commonly occurs. There are still many unanswered questions with respect to the conditions under which the bath occurs and further research in this area is warranted. The smoothing studies have attempted to investigate several areas. First, they have attempted to determine if companies actually do smooth their reported income numbers, and if so, what are the characteristics of the companies which do smooth income. In addition, they have attempted to determine the relative smoothing potential of various accounting variables. Last, the studies dealing with the time-series properties of accounting income have investigated various income generation processes in order to determine the conditions under which smoothing actions are effective.

Several aspects have been drawn from these studies that are important to the development of the current study. For example, the definition of a financial bath used in the current study to develop

the samples is drawn from the work of Copeland and Moore (30). Since there is no research indicating whether the bath is industry-specific, the samples are drawn from a population containing a diversity of industries in order to provide greater generalizability of the results.

Given the limitations of correlation-based smoothing research, this study uses the alternative approach in which a smoother is defined as a firm with a low degree of variability about a trend line. The variability around the trend line for three samples is then investigated in order to determine relative smoothness. The variability around the trend line is measured in this study by two methods. These methods are coefficients of variation (which have not previously been used in this context) and the mean absolute percentage deviation of the actual changes in a variable from its trend.

Several researchers have indicated that variables which are disclosed may not be used as smoothing variables by enterprises and that only variables which can be disguised may be used as smoothing variables. As a result, the current study does not identify and analyze the behavior of specific accounting variables in testing for smoothing patterns. The approach taken is to develop a sample of bath companies and a sample of non-bath companies and to evaluate the relative aggregate variability of these two groups for selected income and nonincome variables.

CHAPTER III

METHODOLOGY

The methodological design used to test the research hypothesis reflects previous work in related areas since this study provides a synthesis of two areas that were previously tested independently. The current research attempts to incorporate some of the strengths of previous work as well as avoid some of the problems associated with previous research.

The development of the methodology in Chapter III is organized around two basic topics. The first topic deals with selection of the bath company samples and the control group. The definition of a financial bath utilized in the study is developed and the criteria for selection of two possible bath company samples and the control group are presented. The second topic deals with the procedures used in testing for smoothing patterns for the samples after selection. The purpose of these procedures is to gather empirical evidence regarding the time-series properties of selected aggregate financial variables for bath and non-bath companies.

Selection of Samples

General Approach

The two objectives and the three methodological phases of this study are developed in Chapter I. It is indicated that the general approach is to compare the dispersion around assumed trend lines for 14 selected variables for each of two possible bath company samples

to the dispersion around the trend lines for the non-bath companies (the control group) for the 14 variables. The first methodological phase is to identify the three samples. This phase is discussed in this section.

The two bath company samples are selected by two procedures called Method A and Method B. Members of the Method A sample are companies disclosing items considered to be bath items (Method A selection variables as defined in a following section) during the period 1973-1976 in their financial statements. Members of the Method B sample are companies meeting two basic criteria. These are (1) one or more years during the period 1973-1976 in which income before extraordinary items and discontinued operations is below its lower 90 percent confidence limit, and (2) evidence of Method B selection variables (as defined in a following section) and/or Method A selection variables. The Method B selection procedure is designed to select sample members that may be disguising bath items by burying them in aggregate financial statement categories during the period 1973-1976. The sample of non-bath companies (the control group) is selected from companies not identified as either Method A or Method B sample members. The procedures used in selecting these three samples are shown in three flow charts in following sections of this chapter.

The data analyzed is obtained from four sources. These are annual report microfiche files, Form 10-K microfiche files, the annual Industrial Compustat tape, and the National Automated Accounting Research System (NAARS) files. These sources are used in a variety of ways to identify sample members and to test for smoothing patterns.

The population of companies from which the samples are drawn is limited to companies which are (1) listed on the New York or American stock exchanges during the period 1973-1976, and (2) listed on the annual Industrial Compustat tape during the period 1967-1976. The population is limited to companies on the New York and American stock exchanges in order to ensure the availability of financial information from annual reports and Form 10-K's. Since the Compustat tape is used in testing for smoothing patterns, a company must be listed on the Compustat tape in order to be considered for selection as a sample member. Certain industries are eliminated from consideration in order to obtain a greater degree of comparability between the financial information in the financial statements of the sample members. These industries include financial institutions (such as banks and savings and loan institutions), utilities, insurance companies, medical organizations (such as hospitals and health care associations), mining activities, real estate operations (such as developers and investment trusts), and heavily regulated industries (such as railroads).

Models Used in Sample Selection

The three models and the three methods of measuring dispersion used in this study are discussed in Appendix C. Two of these models (a least-squares, linear regression model and a mean/standard deviation model) are used in the selection of sample members. The first model used is a linear regression model fitted to income before extraordinary items and discontinued operations for all companies in the population. Companies accepted as members of the Method B sample and the control

group have incomes before extraordinary items and discontinued operations that are fitted with linear regression models significant at the 0.05 level. This model is fitted in order to determine which companies do or do not have one or more years during the period 1973-1976 in which their incomes are below their respective lower 90 percent confidence limits. Companies that do are potential Method B sample members while companies that do not are potential control group members. Additional criteria (shown in the flow charts in following sections) are used to establish whether these companies are accepted as sample members.

Consideration of Changes in Plant Assets

Before a company is selected as a sample member, its history during the period 1967-1976 is examined for changes in plant assets. Enterprises may dispose of assets over time (for example, product lines, divisions, or subsidiaries), or they may acquire assets over time (for example, merger and consolidation activities). Wide fluctuations in assets violates the assumption of a uniform accounting entity over time made in development of the methodology.

In order to obtain sample companies which have not had wide fluctuations in assets, a screening requirement is applied to potential sample members using the two models (linear regression and mean/standard deviation models) discussed in the previous section. First, plant assets for each potential sample member is fitted with a least-squares, linear regression model using end-of-year plant assets during the period 1967-1976. If the regression coefficient is not significant at the 0.05 level, the plant assets are fitted with a mean/standard deviation model.

For each company, utilizing the proper model fitted to plant assets, a coefficient of variation is computed to test fluctuations around the trend. Computation of the coefficient of variation for both of the models is discussed in Appendix C. Any company for which the coefficient of variation is more than 20 percent is not considered for selection as a sample member. This procedure is incorporated into the flow charts shown in following sections.

Selection of the Method A Sample

Members of the Method A sample are companies disclosing bath items (Method A selection variables) during the period 1973-1976. The selection procedures used to select this sample are given in the flow chart shown in Figure 3.1. For purposes of this study a bath is defined as either a material (1) write down or write off of assets, or (2) provision for future estimated expenses or losses. The assumption is made that an item is material when it either reduces income before extraordinary items and discontinued operations or increases a loss before extraordinary items and discontinued operations by 10 percent or more.

Other factors are also important in the determination of bath items. For example, it is important to determine whether the bath item is treated as an extraordinary item or as a part of discontinued operations and thus not included in the computation of income before extraordinary items and discontinued operations, or whether it is treated as ordinary and included in this computation. If it is included, the item must be added back to income before its materiality is determined. All computations are performed with before-tax amounts.

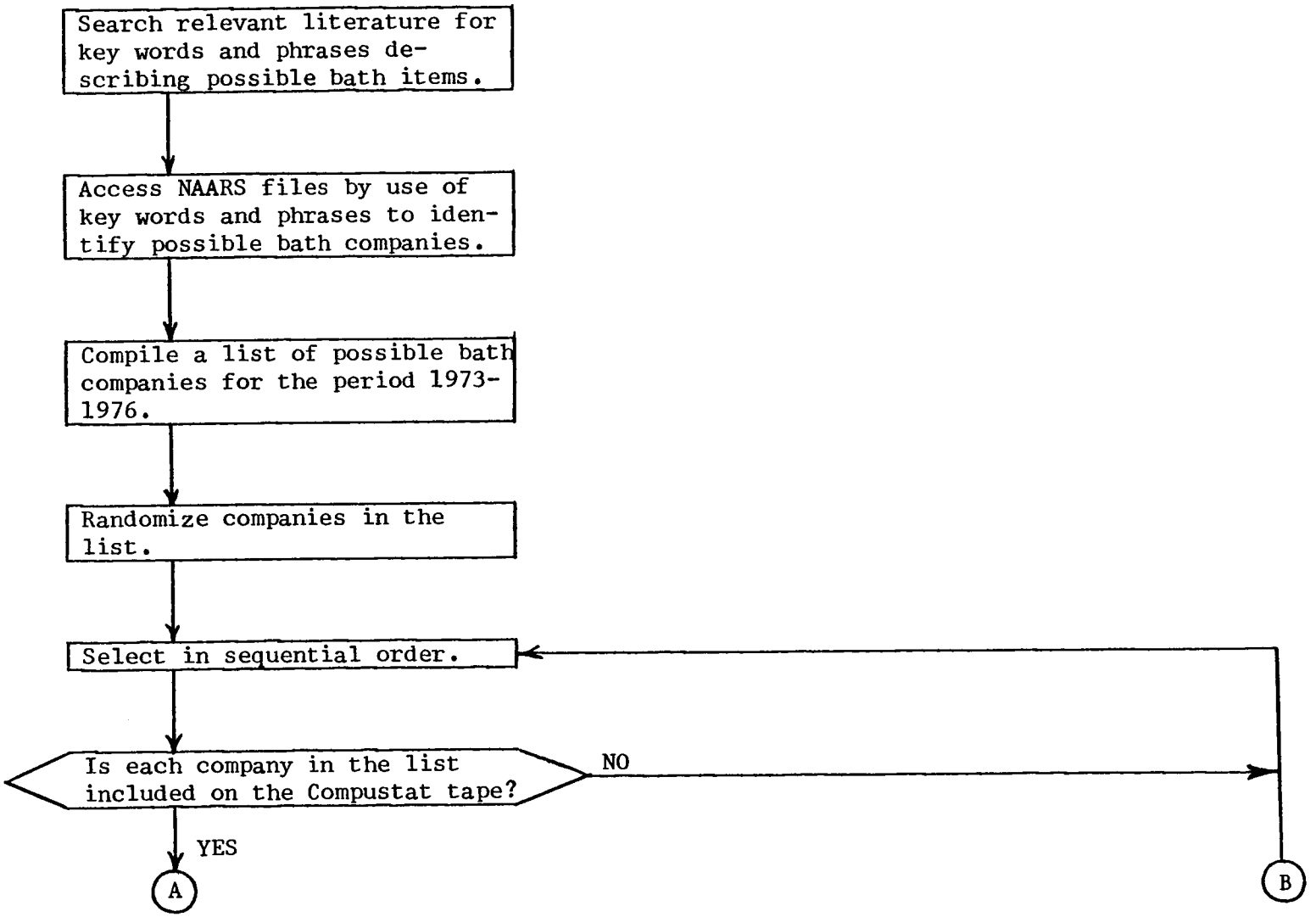


Figure 3.1. Flow chart of the selection procedures for the Method A sample.

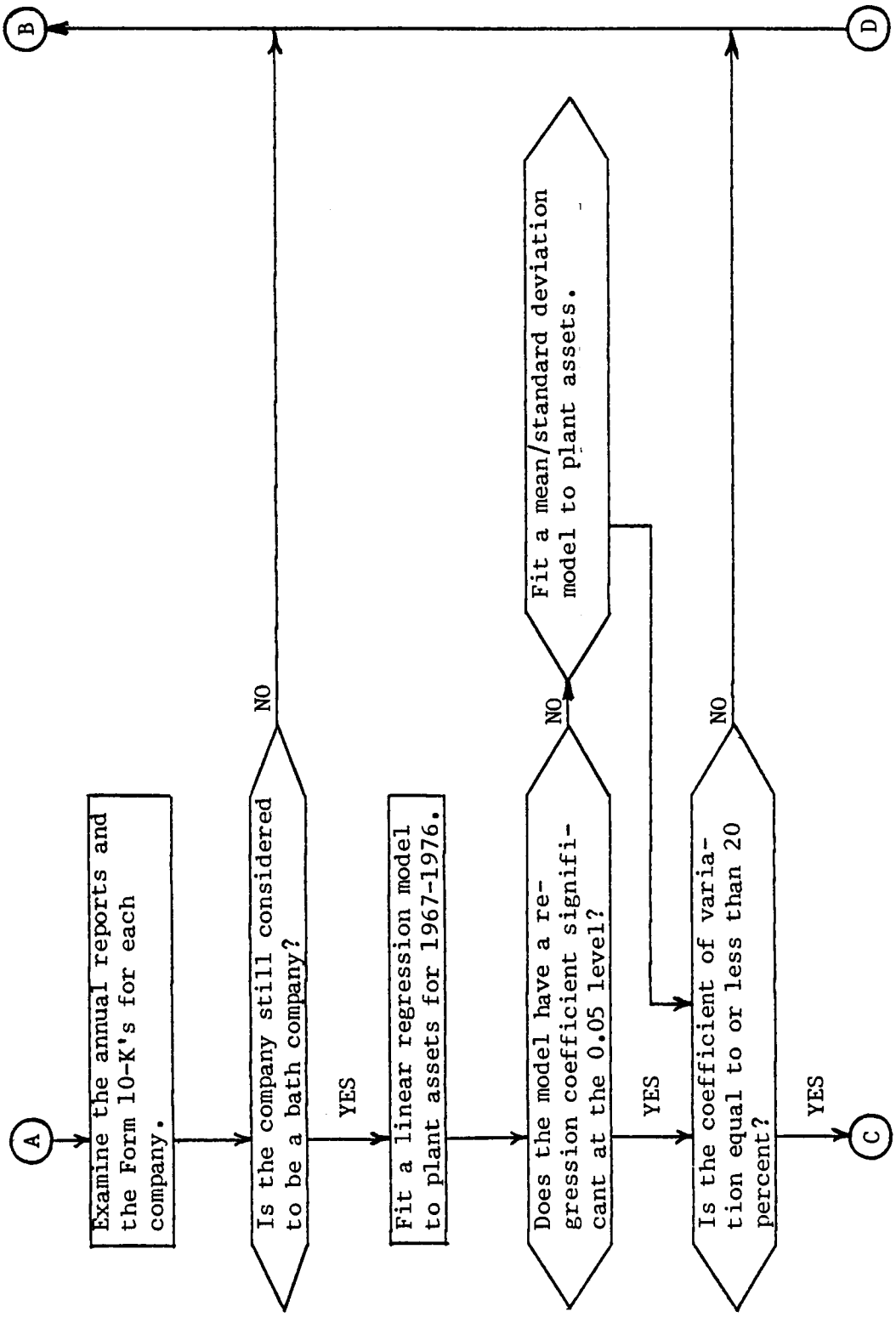


Figure 3.1. (continued)

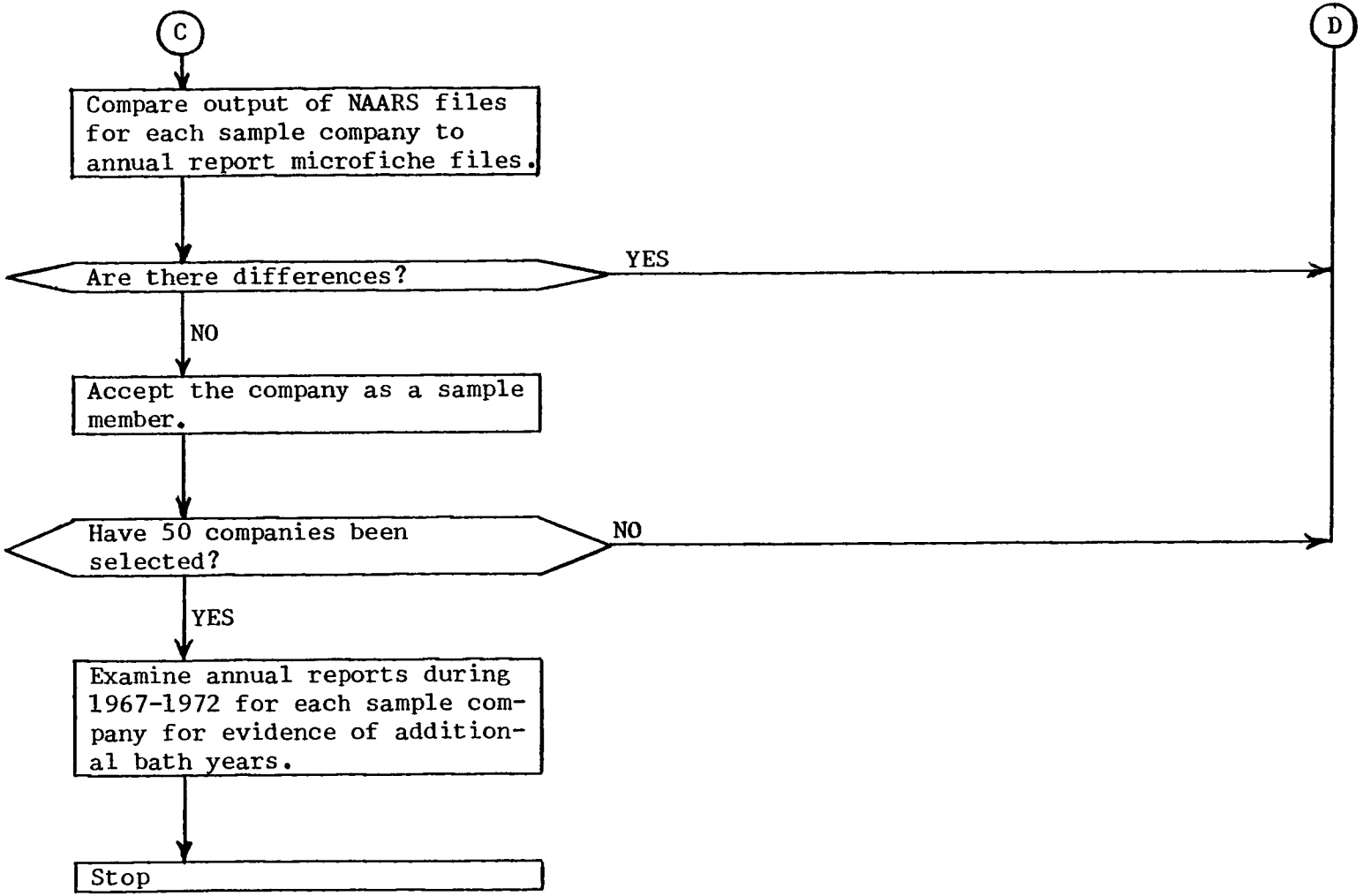


Figure 3.1. (continued)

The amount of the bath item is considered to be the amount before any related tax effect, and the income amount used to determine the materiality of the item is income before extraordinary items and discontinued operations before any income taxes are subtracted.

There is support for the position establishing the cutoff point between material bath items and immaterial bath items as 10 percent of income before extraordinary items and discontinued operations. For example, Bernstein (20) indicates that the modal area of practice suggests a border zone of 10-15 percent in determining what is material and what is not. Graham, Dodd, and Cottle (47) indicate that major nonrecurring items should be discounted in the analysis of short-term earnings. Small items which affect results less than 10 percent in the aggregate should be accepted as reported. In addition, Copeland and Moore (30) also use a 10 percent decision rule. Since the accounting profession has not developed specific materiality criteria, a number of decision rules have been used in past studies (22).

In general, bath items are the result of discretionary accounting decisions made by management when it perceives that changed conditions justify a non-exchange adjustment where ultimate realization is not objectively determinable at the time of issuance of the financial statements (30). As a result, the use of bath techniques is heavily dependent on the exercise of management's judgement. Another factor of great importance is the timing of the adjustments. Management may use bath items at the time it considers most advantageous. In addition, it should be noted that by definition bath items are income-reducing discretionary accounting decisions.

The main source used in identification of the Method A sample is the NAARS files (12). This system contains the financial statements, footnotes, and other information found in the annual reports for most companies on the New York and American stock exchanges starting with the year 1973. This system is accessed by the use of key words and phrases. For purposes of this study, a list of key words that might describe bath items is given in Appendix A and the NAARS system is accessed using these key words. The resulting printouts indicate which companies have annual reports containing these key words and phrases, the years in which these key words and phrases appear, and their locations within the annual reports. In addition, the printouts provide 10 words before and 10 words after the key words or phrases in order to give an indication of content. Since the printouts provide only a brief excerpt from the annual reports, it is necessary to utilize annual report and Form 10-K microfiche files to supplement the printouts in identifying bath companies.

Selection of the Method B Sample

The purpose for selection of the Method B sample is to identify possible bath companies which may be disguising bath items by burying them in aggregate financial statement categories. The selection procedures for this sample are shown in the flow chart given in Figure 3.2. In order to select this sample, the assumption is made that a company is taking a bath during the period 1973-1976 when its income before extraordinary items and discontinued operations is below its lower 90 percent confidence limit in one or more years, and

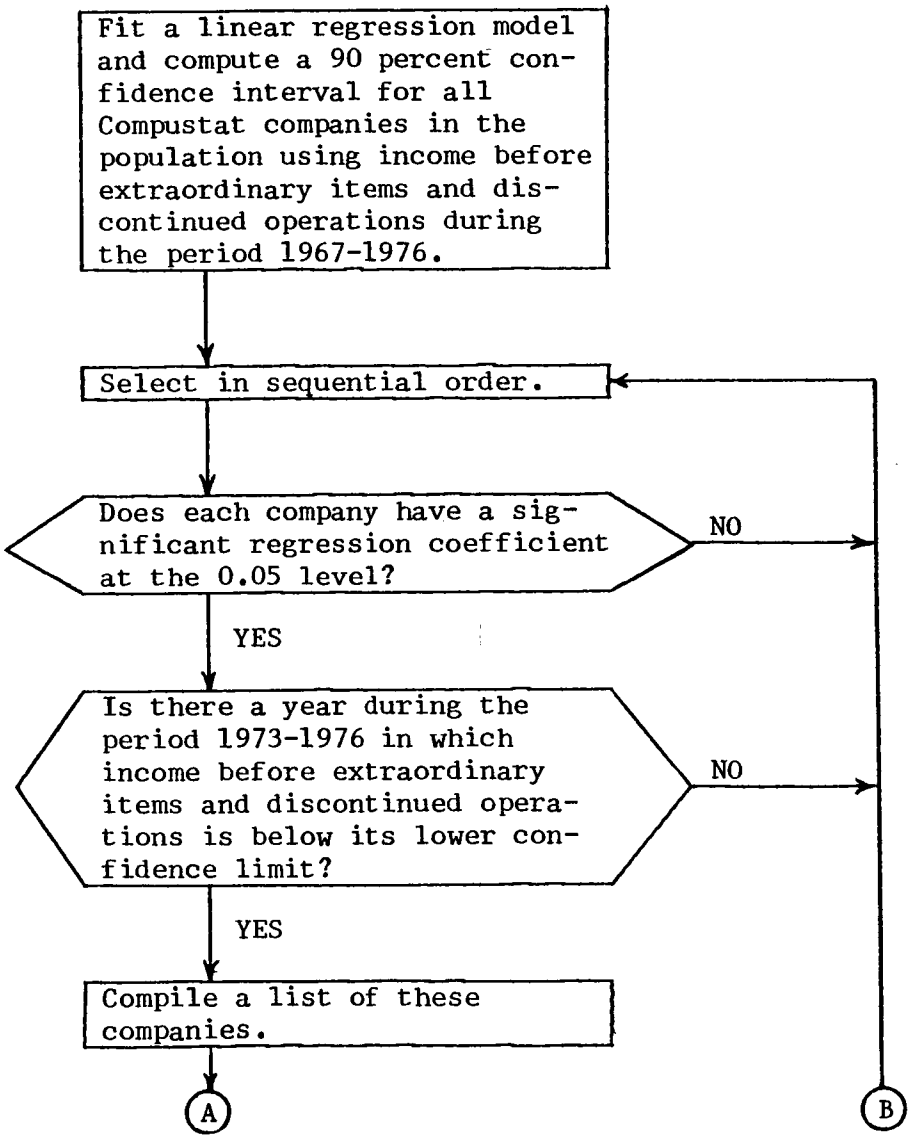


Figure 3.2. Flow chart of the selection procedures for the Method B sample.

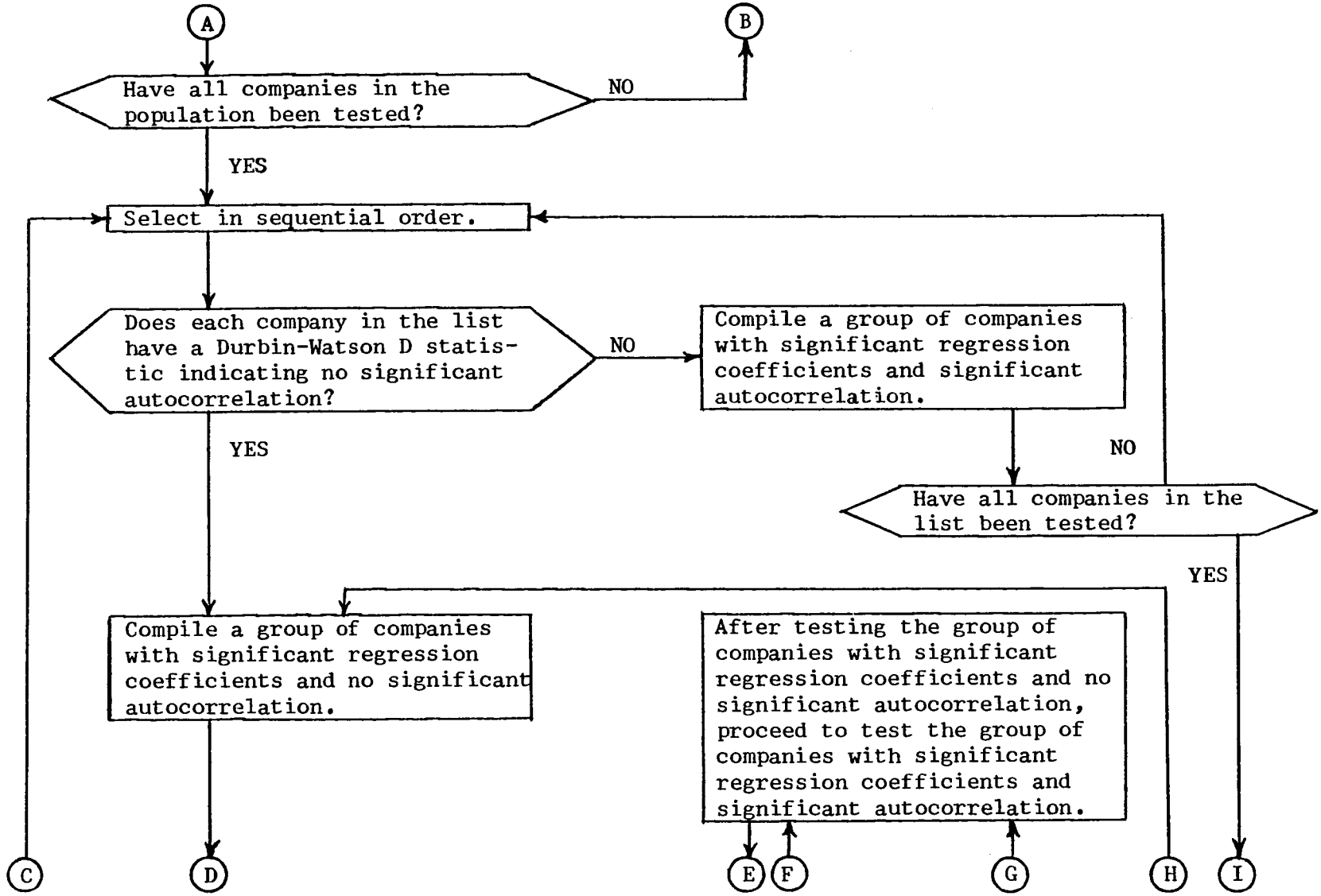


Figure 3.2. (continued)

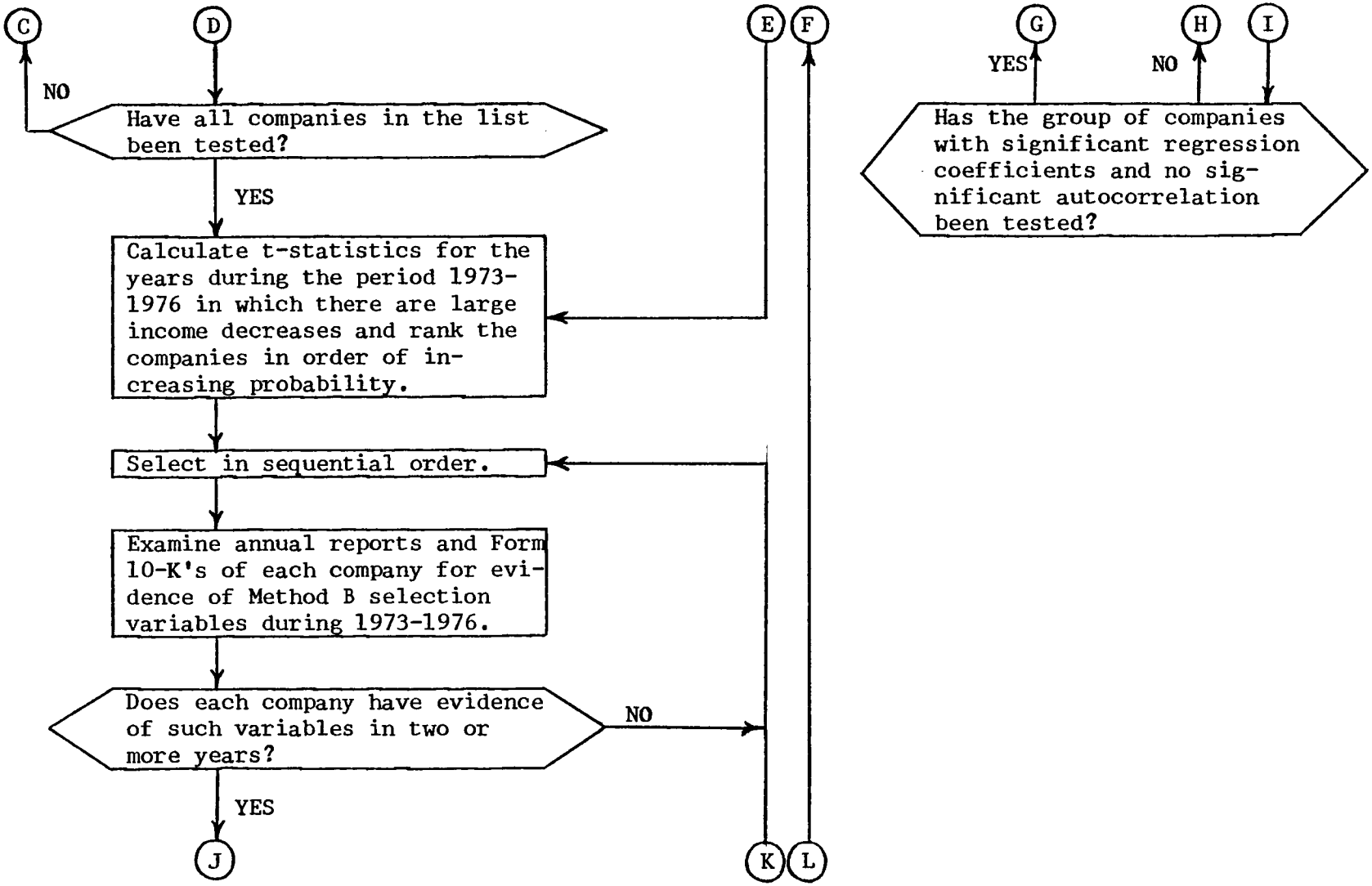


Figure 3.2. (continued)

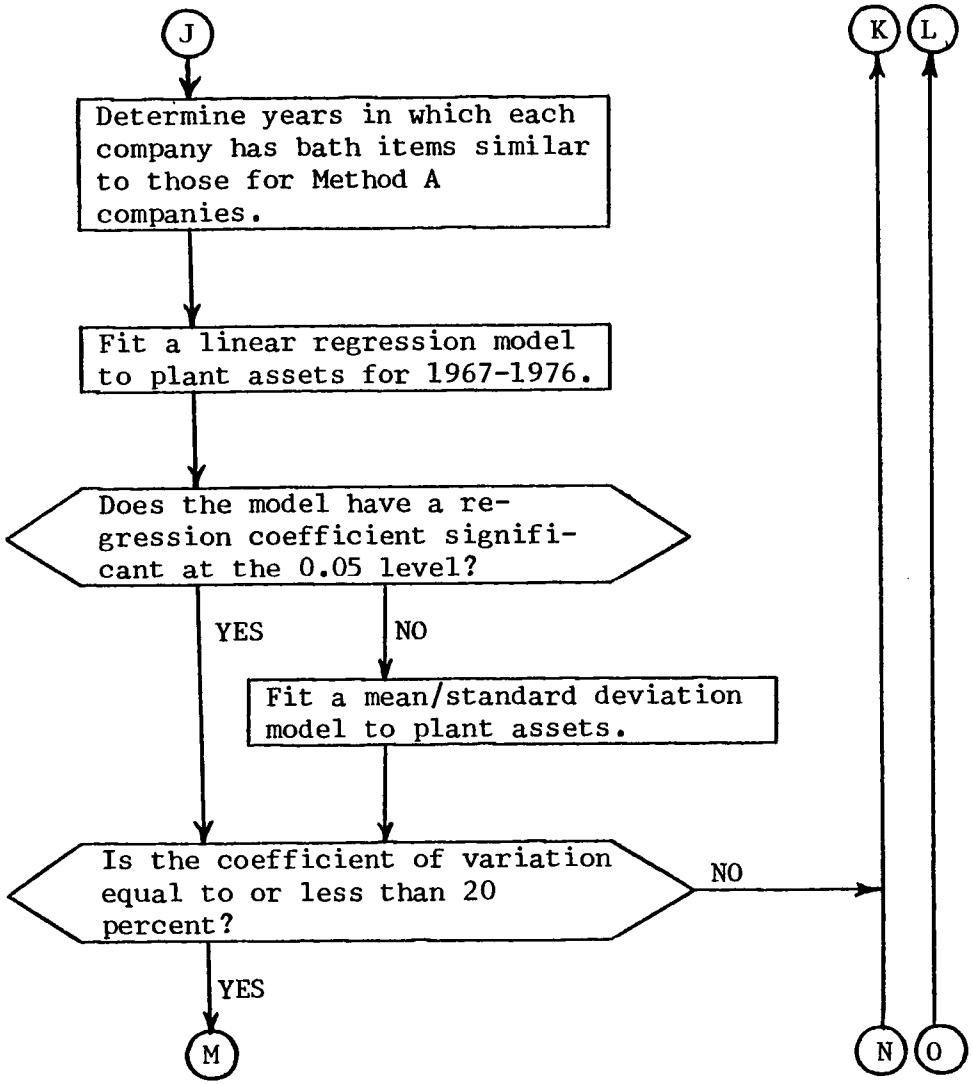


Figure 3.2. (continued)

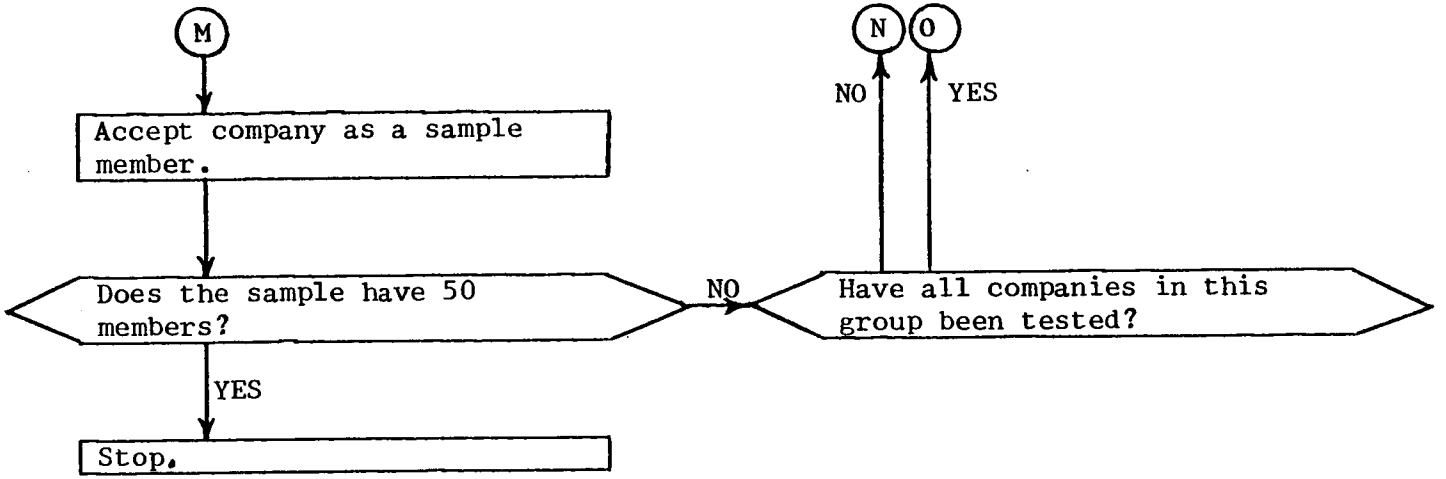


Figure 3.2. (continued)

when it has used either Method A selection variables (bath items) or Method B selection variables during 1967-1976. Method B selection variables are defined as write offs or write downs of assets or provisions for future estimated expenses of the kind given in Appendix A which are not material, and/or extraordinary items. A company must have evidence of Method A selection variables and/or Method B selection variables in two or more years during the 10-year period 1967-1976 in order to be accepted as a sample member.

The assumption made in support of the Method B sample is that, starting in 1973, companies have greater incentive to disguise bath items in aggregate financial statement categories due to pronouncements of the Accounting Principles Board (APB), the Financial Accounting Standards Board (FASB), and the Securities and Exchange Commission (SEC). In 1973 the APB limited the types and kinds of items that may be treated as extraordinary in the financial statements as well as more clearly defined the accounting treatment for discontinued operations. In addition, the SEC, in 1973, began to require greater disclosure detail for items treated as extraordinary. In 1976 the FASB issued new requirements for the reporting of loss contingencies. Bath items can often be defined as loss contingencies, and as a result, these requirements affect the reporting of bath items. Since the FASB found it necessary to issue such requirements, the suggestion is that treatment of loss contingencies was not previously consistent. The pronouncements that produced these results are discussed in a later section of this chapter. The results of these pronouncements may have been to give companies the incentive to disguise bath items during

the period 1973-1976 in the computation of ordinary income, especially since an assumption of this project is that only disguised bath items have the potential to affect investor perceptions.

Selection of the Control Group

The control group is selected from companies in the population not identified as Method A or Method B sample members. The selection procedures are shown in the flow chart given in Figure 3.3. Companies in the control group are not allowed to have evidence of Method A selection variables. They are allowed to have evidence of Method B selection variables in two or less years.

Tests of the Accuracy of the Data Bases

Recently questions have been raised concerning the accuracy of the data on Compustat files (69, 72). In order to test the files and ensure that data used in this study are accurate, a random sample of 5 percent of the sample companies is drawn. Selected data from the annual reports for each company during the period 1972-1976 is compared to the corresponding data on the Compustat files to determine if there are any substantive discrepancies. The data selected for tests are four of the 14 selected variables identified in a following section.

There may also be errors present in the NAARS files that can bias the selection results. For example, incorrect data can be included for certain companies due to input mistakes or the data for certain companies can be interchanged on the tapes. In order to test for errors in the NAARS files of importance in this study, the data

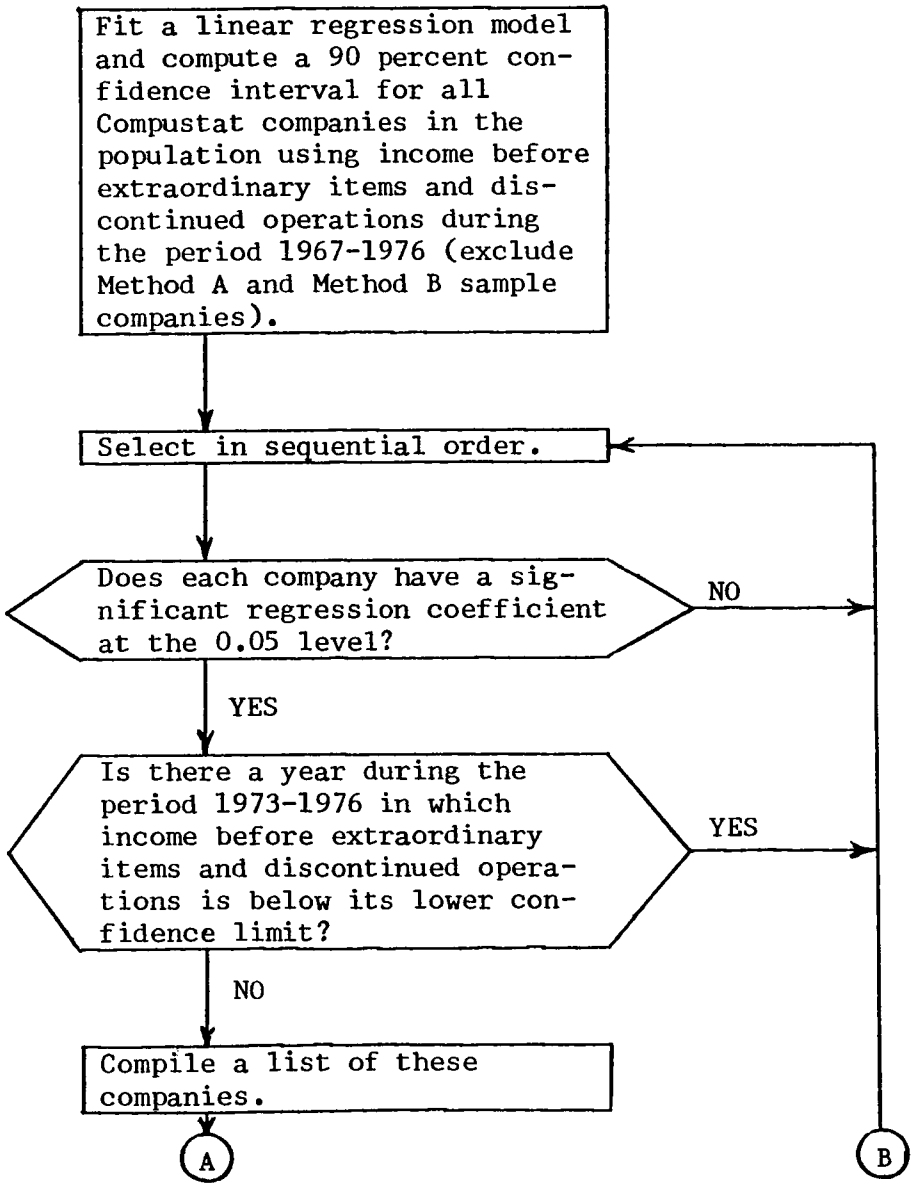


Figure 3.3. Flow chart of the selection procedures for the control group.

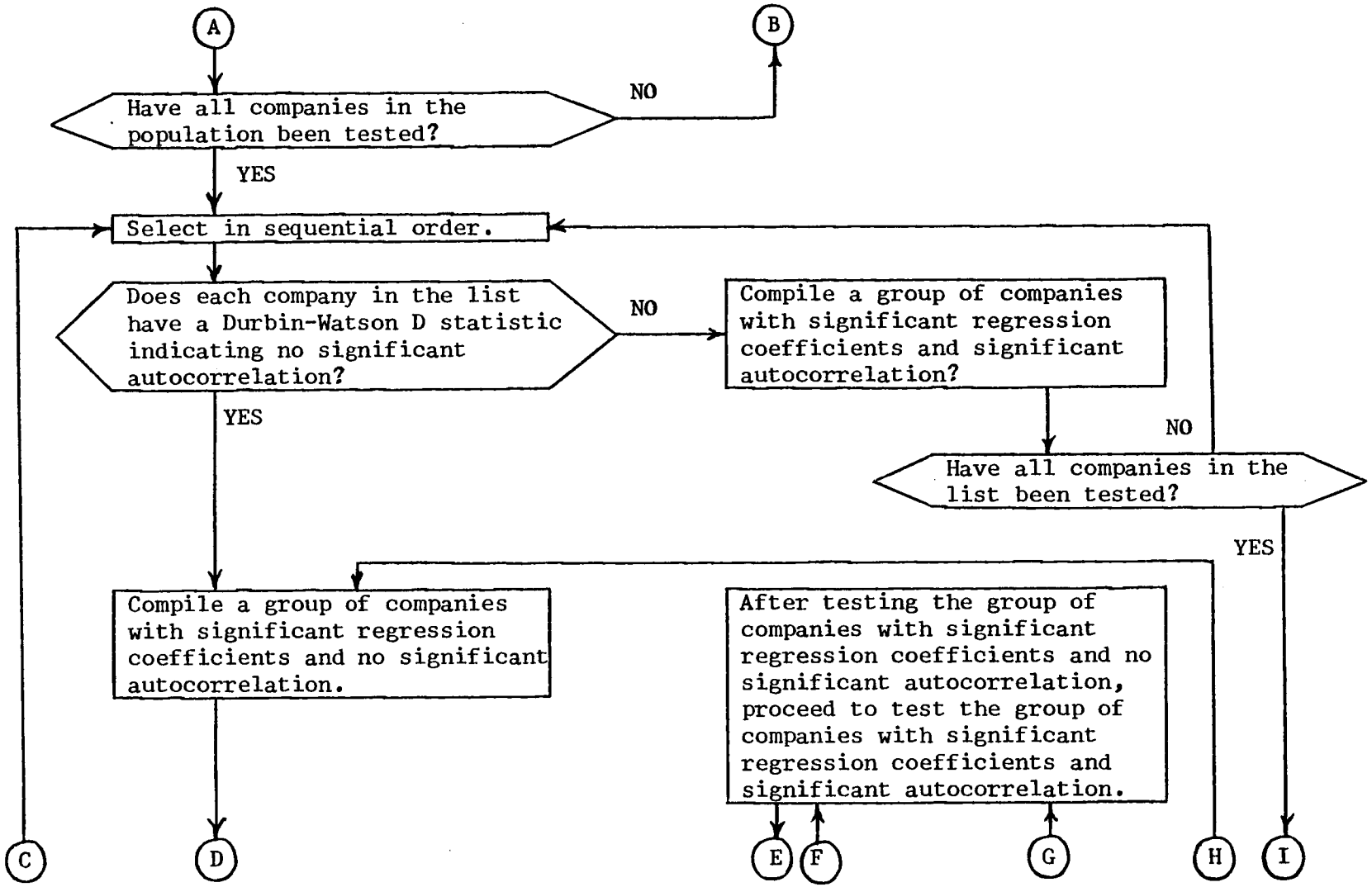


Figure 3.3. (continued)

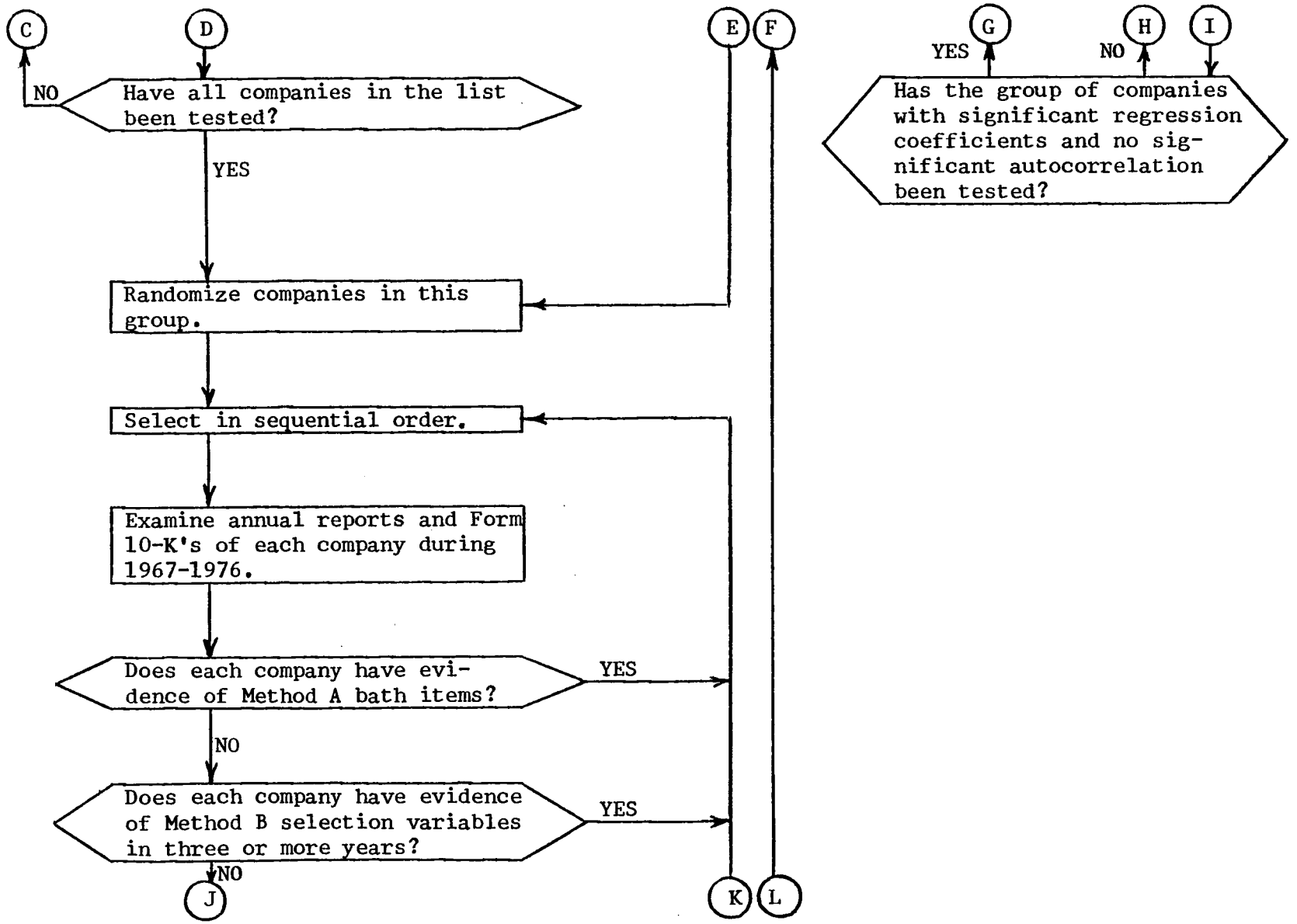


Figure 3.3. (continued)

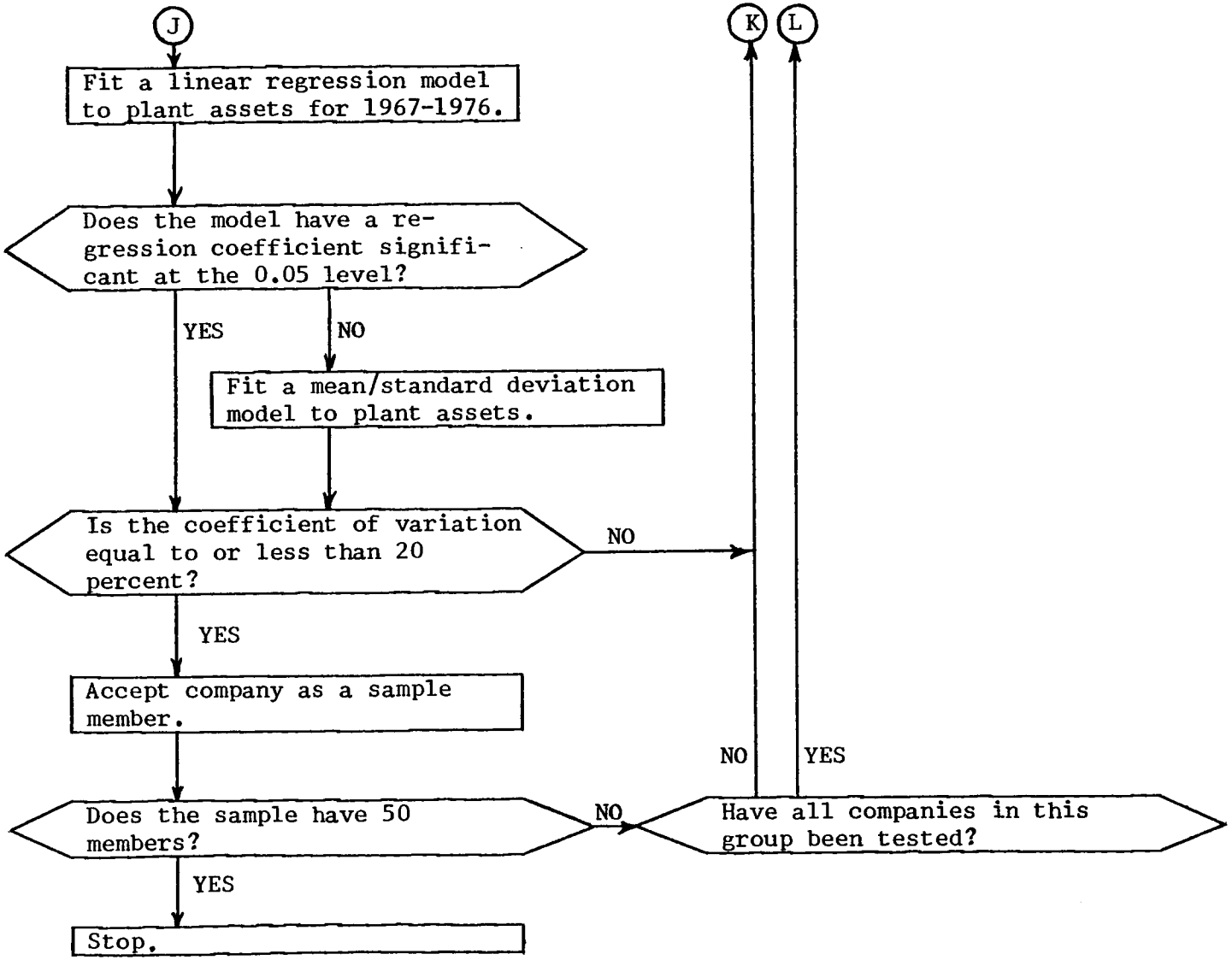


Figure 3.3. (continued)

in NAARS printouts pertaining to the possible bath items for each of the Method A companies during the period 1973-1976 is compared to the annual report microfiche files during the search for additional possible bath items.

Treatment of Extraordinary Items in Financial Statements

Since bath items have often been treated as extraordinary, it is necessary to discuss accounting treatment of extraordinary items. The disclosure of extraordinary items in the income statement during the period of the study is affected by two Opinions. The first Opinion is Accounting Principles Board Opinion No. 9 (3), entitled "Reporting the Results of Operations," which became effective for fiscal periods beginning after December 31, 1966. Opinion No. 9 defined extraordinary items as:

> Such events and transactions are identified primarily by the nature of the underlying occurrence. They will be of a character significantly different from the typical or customary business activities of the entity. Accordingly, they will be events and transactions of material effect which would not be expected to recur frequently and which would not be considered as recurring factors in any evaluation of the ordinary operating processes of the business (3, paragraph 21).

The criteria of Opinion No. 9 were difficult to interpret and significant differences of opinion developed as to certain of the provisions (4, paragraph 2). In addition, Opinion No. 9 left management considerable flexibility in classifying items as either ordinary or extraordinary and in therefore conveying the message desired by management. Items treated as extraordinary were identified as such, whereas items treated as ordinary could be buried in the income

statement and not specifically identified. Alternatively, items treated as ordinary could be specifically identified as a line item or disclosed in the footnotes. To a large extent management was able to decide what treatment it preferred. This inconsistency presents some difficulty in identification of bath items. If a specific bath item is to be identified, it must be disclosed.

Due to criticisms of Opinion No. 9, the APB issued Accounting Principles Board Opinion No. 30 (4), entitled "Reporting the Results of Operations," which became effective for events and transactions after September 30, 1973. Opinion No. 30 establishes new requirements for the treatment of extraordinary items and also establishes new accounting treament for disclosure and reporting of discontinued operations of enterprises. This Opinion indicates that discontinued operations should be reported separately from results of continuing operations. Any gain or loss should also be reported with the discontinued operations.

One of the results of the required treatment for discontinued operations is that items that once may have been disclosed individually (and may have been considered bath items) may now be aggregated and included in the computation of the results of discontinued operations. Companies may establish a "Provision for Discontinued Operations" and include in that provision write downs and write offs of assets such as plant and equipment and inventories as well as many other items. Disclosure may be such that the types and amounts of individual items may not be ascertainable.

With respect to extraordinary items, this Opinion states that:

> Extraordinary items are events and transactions that are distinguished by their unusual nature and by the infrequency of their occurrence (4, paragraph 20).

Most gains and losses should not be reported as extraordinary unless they clearly meet the requirements. The number of items that can now be considered extraordinary is reduced; most items must now be considered ordinary. Opinion No. 30 further states, however, that:

> A material event or transaction that is unusual in nature or occurs infrequently but not both, and therefore does not meet both criteria for classification as an extraordinary item, should be reported as a separate component of income from continuing operations. The nature and financial effects of each event or transaction should be disclosed on the face of the income statement or, alternatively, in notes to the financial statements (4, paragraph 26).

This criterion still enables the identification of bath items after September 30, 1973, as long as companies follow this suggestion. It should be noted, however, that this section requires a determination of when an event is unusual in nature or whether an event occurs infrequently. Management still must use a great deal of discretionary judgement in making these decisions. Management may still have the option to use the treatment it prefers and convey the message it considers optimal.

Research on the effects of Opinion No. 30 has indicated that the number and different kinds of extraordinary items disclosed after the effective date of this Opinion have decreased significantly (for example, see 52 and 19). The requirements are now evidently stringent enough that most events and transactions are classified as ordinary. Even though there is a provision in Opinion No. 30 for disclosure of unusual or infrequently occurring items when extraordinary treatment

is not warranted, companies may not be using this treatment. It is an assumption of this study that there is great incentive for companies not to do so, but instead to include such items in aggregate statement categories without disclosure.

An additional factor that affects the incentive to disguise bath items are actions by the SEC. In response to pressure for clarification of the meaning of the word extraordinary, the SEC acted in 1973 to improve the reporting and disclosure of extraordinary items (73). Corporations are required to disclose certain information about extraordinary items in detail. The information required is (73, p. 245):

1. the date of the registrant's determination to make the charge or credit,
2. the reason for the charge or credit,
3. an analysis of its components,
4. an estimation of the cash flows associated with the item, and
5. a description of the accounting principles followed and any changes therein in connection with the charge or credit.

In addition, the firm's independent accountant must furnish information with respect to the conformity with generally accepted accounting principles in accounting for the transaction.

As a result of these actions of the APB and the SEC taken in 1973, the number and kinds of items treated as extraordinary have decreased and the disclosure detail required for those items treated as extraordinary has increased. Items once treated as extraordinary must now be treated as ordinary and included in the calculation of

income before extraordinary items. If it is true that disclosure of an item reduces its potential to affect investor perceptions, the effect of these pronouncements may be to provide enterprises greater incentive to treat items as ordinary and bury them in aggregate statement categories.

Another pronouncement of interest in this study is Statement of Financial Accounting Standards No. 5 (SFAS No.5) (38) entitled "Accounting for Contingencies." This Statement defines a contingency as:

> . . . an existing condition, situation, or set of circumstances involving uncertainty as to possible gain (hereinafter a "gain contingency") or loss (hereinafter a "loss contingency") to an enterprise that will ultimately be resolved when one or more future events occur or fail to occur (38, paragraph 1).

The conclusions of Accounting Research Bulletin No. 50 (ARB No. 50) (5), "Contingencies," are carried forward with respect to gain contingencies without reconsideration, while SFAS No. 5 establishes standards of reporting and accounting for loss contingencies. Loss contingencies include many charges to income that are often referred to as expenses and losses, and the term, therefore, encompasses many items that may be identified as bath items.

Loss contingencies must be accrued by a charge to income if both of the following conditions are met (38, paragraph 8):

(a) Information available prior to issuance of the financial statements indicates that it is probable that an asset had been impaired or a liability had been incurred at the date of the financial statements. It is implicit in this condition that it must be probable that one or more future events will occur confirming the fact of the loss.
(b) The amount of loss can be reasonably estimated.

Disclosure of accruals made and the amounts accrued may be necessary to prevent the statements from being misleading (38, paragraph 9).

If an accrual is not made for a loss contingency because the conditions in the previous paragraph are not met, or additional loss exposure exists in excess of the accrual, disclosures of the contingency must be made when at least a reasonable possibility exists that a loss or an additional loss may have been incurred (38, paragraph 10). Certain loss contingencies are presently disclosed even though the possibility of loss may be remote. Disclosure of these loss contingencies and similar contingencies should be continued (38, paragraph 12). General or unspecified risks do not meet the accrual requirements, so no accrual should be made and no disclosure is required (38, paragraph 14).

The result of these requirements is that loss contingencies which are probable or reasonably possible and certain loss contingencies which are remote must be accrued or disclosed. Companies do not have the option of nondisclosure for the majority of items classified as loss contingencies. The fact that the FASB found it necessary to issue this Statement indicates that previous treatment of loss contingencies by enterprises was not consistent. Enterprises were able to report contingencies in the manner they perceived to be most desirable.

SFAS No. 5 is in effect for fiscal years beginning on or after July 1, 1975, although earlier application is encouraged. This Statement is in effect, therefore, for the last year covered by this study. In 1976 loss contingencies should be disclosed, while during the period 1967 through 1975 companies had more options available to them for presentation of loss contingencies.

This Statement does not cover the question of whether it is appropriate to write down the carrying amount of an operating asset to an amount expected to be recoverable through future operations when the carrying amount is greater. Write down or write off of assets is an important bath technique. Write down or write off of assets is covered by Opinion No. 30, however, as long as the assets represent the disposal of a segment of a business.

Measurement of Time-Series Variability

The second methodological phase is to compute sets of dispersion-measurement values for the three samples for 14 selected financial variables using two measures of dispersion. Computation of these sets of values is discussed in this section.

Analysis of Smoothing Patterns

Income smoothing is defined as the dampening of earnings fluctuations around a time trend of earnings (18, p. 653). The basic test for evidence of smoothing, therefore, is to define an expected earnings trend and to investigate fluctuations around that trend. For purposes of this study the earnings trend is defined as that produced by least-squares, linear regression techniques.

A fundamental problem in smoothing is to determine the size and the direction of the needed adjustments. The adjustment may be too large, in which case counter-smoothing is produced. On the other hand, the adjustment may be too small and not produce the desired result. Effective smoothing requires that management develop a normal

income trend such that the level of current earnings can be compared to what is considered normal, and the adjustment thereby determined (18, p. 655).

Normal earnings for a year are defined to be the earnings that result after all systematically expected expenses are deducted from the trend value of prospective revenues (18, p. 655). These revenues and expenses represent the expected values of their respective probability distributions. Various trends can be assumed for enterprise normal income. A common assumption for normal income is that management desires a constant time trend of earnings per share. This assumption is often made in the general business literature (75, p. 136). An advantage of a time trend assumption is that conventional techniques can be used to separate the earnings time trend from other variation such as seasonal variation, cyclical variation, and residual variation.

Disturbances in the income series are created by disturbances in the revenue and expense series. If disturbances in the income series (both above- and below-trend disturbances) are to be smoothed, action must be taken in a given year to increase/decrease revenues and/or increase/decrease expenses in the proper direction and by the correct amount. In a year when real profits before smoothing actions are expected to be above-trend, the desire is to reduce reported profits by reducing revenues, by increasing expenses, or by a combination of these two actions. In a year when real profits before smoothing actions are to be below-trend, the desire is to increase reported profits by increasing revenues, by decreasing expenses, or by a combination of these two actions.

As discussed previously, the best smoothing techniques may be those that do not have to be disclosed and whose specific results can be buried, and therefore disguised, in various aggregate statement categories. The best test for smoothing patterns, therefore, may be to analyze dispersion around the postulated time-series trend for various aggregate financial statement categories, in contrast to analysis of specific smoothing variables that have been disclosed (such as selling and advertising expense, investment credit, or incentive compensation). Many prior smoothing studies have utilized specific variables that have been disclosed rather than analyzing a variety of possible techniques. By observing and testing the end effect of possible smoothing attempts (dispersion around the trend), it is not necessary to determine all of the specific techniques actually used. Determination of all techniques that may have been used is impossible to accomplish from the information found in the financial statements.

Computation of Dispersion-Measurement Values

In order to test for significant differences in smoothing patterns between bath and non-bath companies, 14 selected enterprise time-series variables are used. These variables are:

1. Revenues;
2. Cost of goods sold;
3. Selling, general, and administrative expenses;
4. Income before special items, extraordinary items, and discontinued operations;

5. Income before extraordinary items and discontinued operations;
6. Restated income before extraordinary items and discontinued operations;
7. Primary earnings per share;
8. Restated primary earnings per share;
9. Fully diluted earnings per share;
10. Taxes;
11. Dividends per share;
12. Production (cost of sales plus change in inventory);
13. Capital expenditures ratio (annual capital expenditures to net end-of-year plant and equipment balance); and
14. Current ratio.

Use of these variables enables tests to be performed for all major aggregate financial statement categories commonly disclosed as well as for other important variables. Six of the 14 variables are income variables and are used in testing for income smoothing patterns. The remaining eight variables are nonincome variables.

The basic test procedure is to compare a set of dispersion-measurement values for one of the two bath company samples to the corresponding set of dispersion-measurement values for the control group for each of the 14 selected variables. In addition, sets of values for the Method A sample are compared to sets of values for the Method B sample for each of the 14 variables. The sets of dispersion-measurement values are computed using two procedures called Test I and Test II. An explanation of these procedures is given in Appendix C and reference should be made to this discussion. In addition, flow

charts describing the tests made under both the Test I and the Test II procedures are shown in Figure 3.4. and in Figure 3.5.

For each variable, a set of dispersion-measurement values is computed for each of the three samples using the two test procedures. Then a set of values for the Method A sample is compared to a set of values for the control group for each of the 14 variables, a set of values for the Method B sample is compared to a set of values for the control group for each of the 14 variables, and a set of values for the Method A sample is compared to a set of values for the Method B sample for each of the 14 variables. These comparisons are performed using dispersion-measurement values calculated under both Test I and Test II procedures.

This research design is shown in Table 3.1. In addition, this design is illustrated in Table 1.1. on page 30 in a different format. Reference to these two tables provides a perspective of the tests for smoothing patterns performed in this study.

Comparisons of Sets of Dispersion-Measurement Values

In testing for differences in the distributions of sets of dispersion-measurement values, the statistical procedure used is a nonparametric Mann-Whitney U test (76, pp. 116-127). The Mann-Whitney U test may be used to test whether two independent groups have been drawn from the same population when at least ordinal measurement has been obtained. This test is a useful alternative to the parametric t-test when it is desired to avoid the assumptions of the t-test or when measurement in the research is weaker than interval scaling.

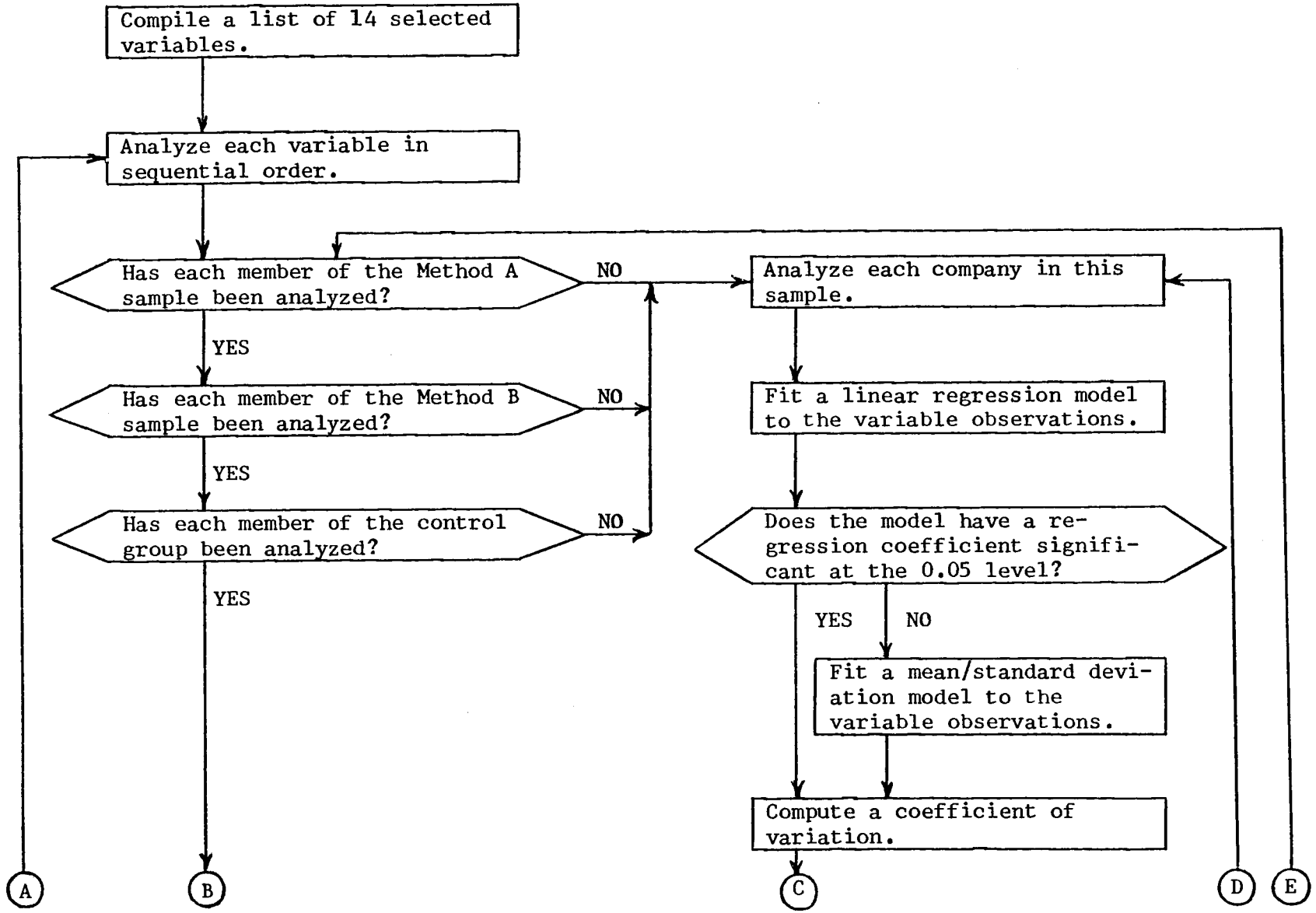


Figure 3.4. Comparisons using Test I procedures.

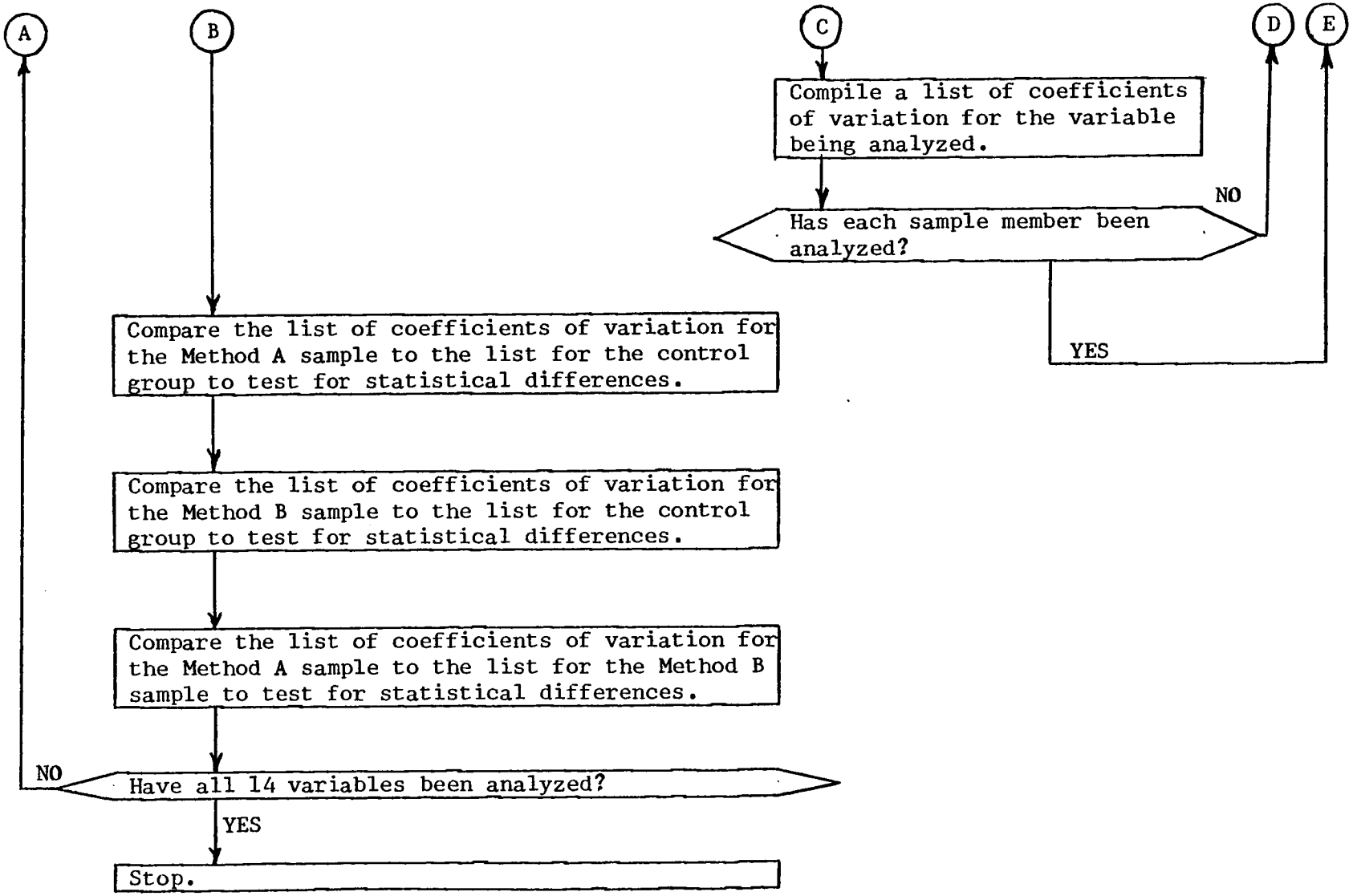


Figure 3.4. (continued)

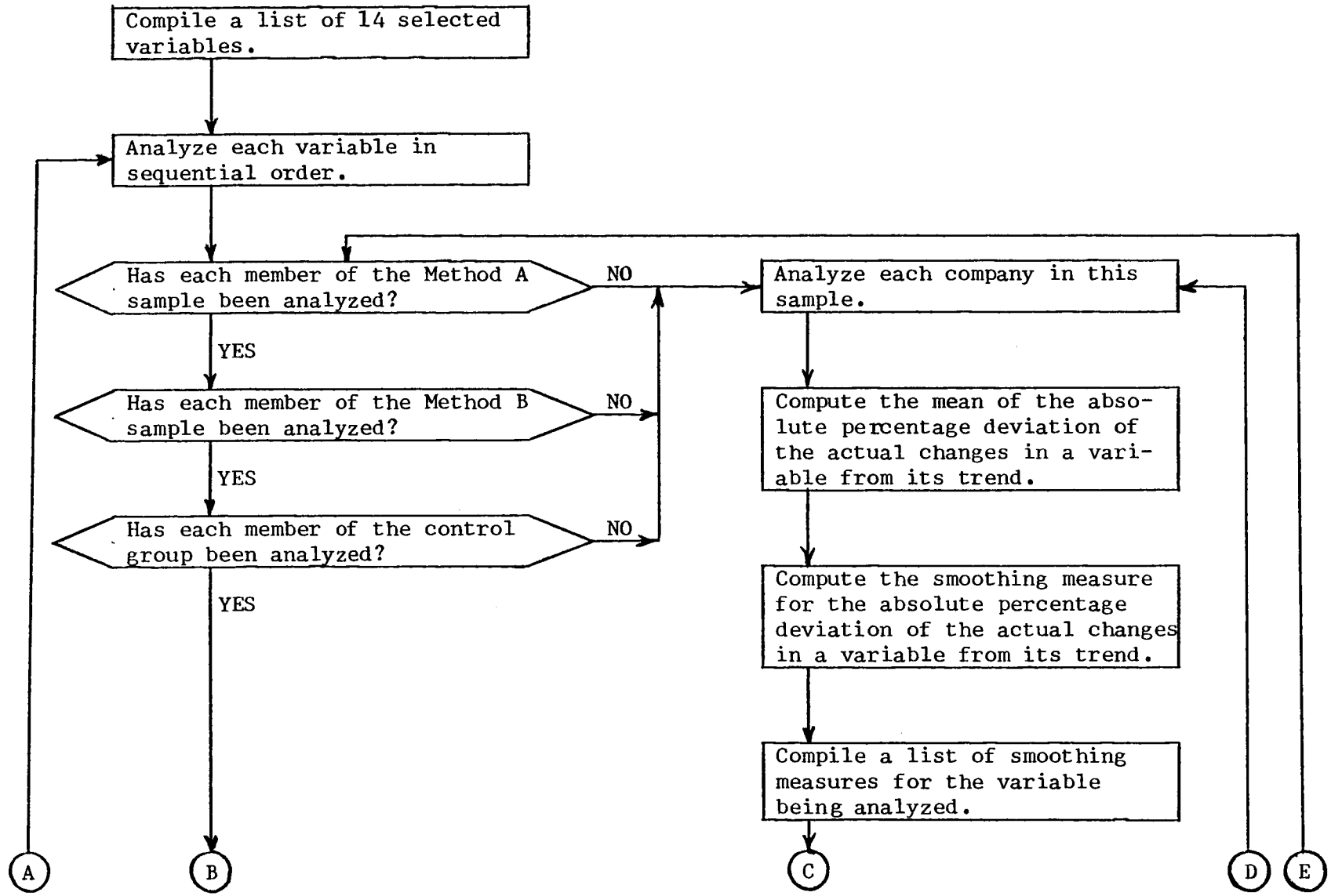


Figure 3.5. Comparisons using Test II procedures.

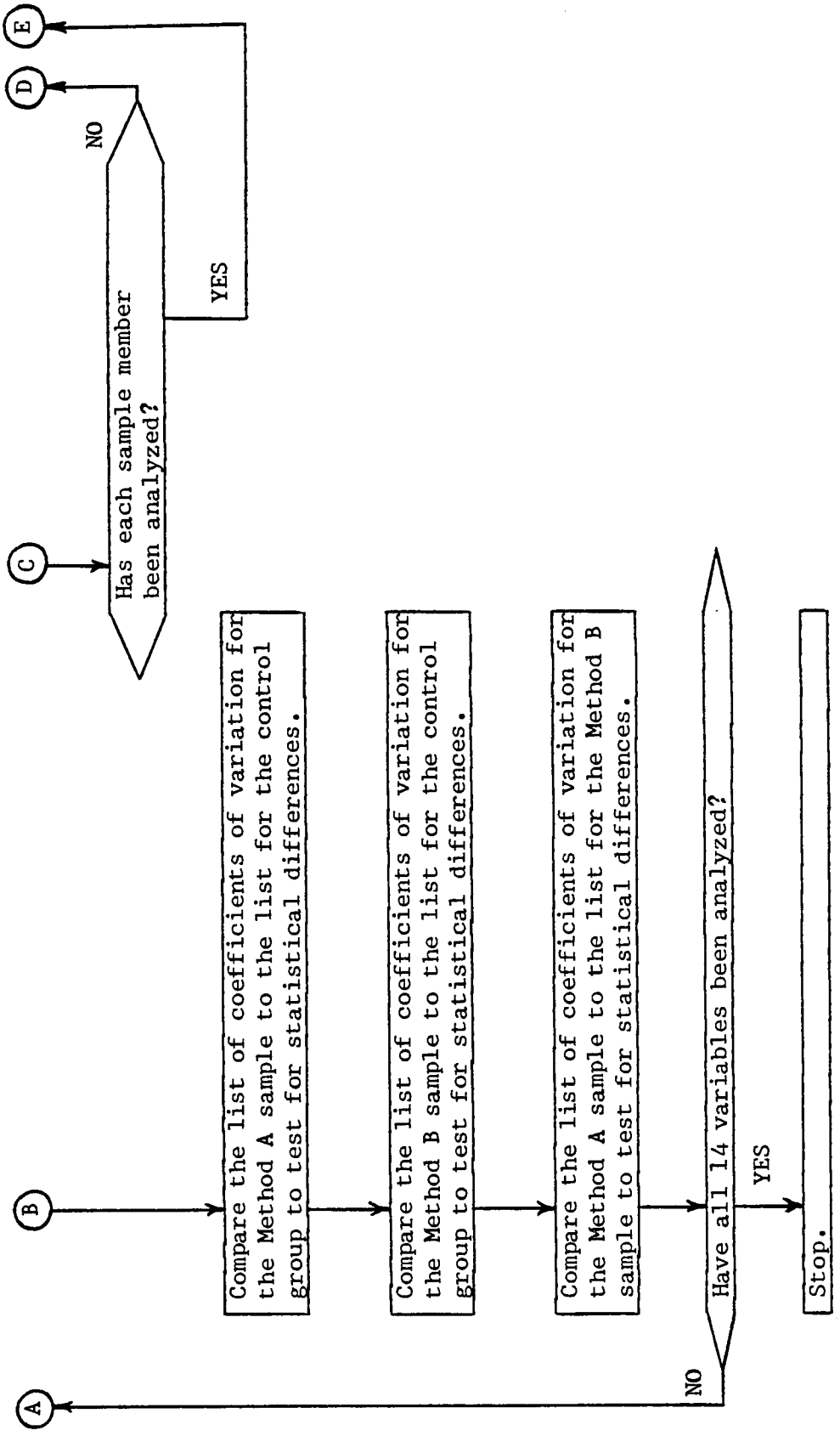


Figure 3.5. (continued)

Table 3.1. Research design.

Variable	Method A Sample	Control Group	Method B Sample
1	Test I	Test I	Test I
1	Test I		Test I
1	Test II	Test II	Test II
1	Test II		Test II
2	Test I	Test I	Test I
2	Test I		Test I
2	Test II	Test II	Test II
2	Test II		Test II
3	Test I	Test I	Test I
3	Test I		Test I
3	Test II	Test II	Test II
3	Test II		Test II
4	Test I	Test I	Test I
4	Test I		Test I
4	Test II	Test II	Test II
4	Test II		Test II
5	Test I	Test I	Test I
5	Test I		Test I
5	Test II	Test II	Test II
5	Test II		Test II
6	Test I	Test I	Test I
6	Test I		Test I
6	Test II	Test II	Test II
6	Test II		Test II
7	Test I	Test I	Test I
7	Test I		Test I
7	Test II	Test II	Test II
7	Test II		Test II
8	Test I	Test I	Test I
8	Test I		Test I
8	Test II	Test II	Test II
8	Test II		Test II
9	Test I	Test I	Test I
9	Test I		Test I
9	Test II	Test II	Test II
9	Test II		Test II

Table 3.1. (continued)

Variable	Method A Sample	Control Group	Method B Sample
10	Test I	Test I	Test I
10	Test I		Test I
10	Test II	Test II	Test II
10	Test II		Test II
11	Test I	Test I	Test I
11	Test I		Test I
11	Test II	Test II	Test II
11	Test II		Test II
12	Test I	Test I	Test I
12	Test I		Test I
12	Test II	Test II	Test II
12	Test II		Test II
13	Test I	Test I	Test I
13	Test I		Test I
13	Test II	Test II	Test II
13	Test II		Test II
14	Test I	Test I	Test I
14	Test I		Test I
14	Test II	Test II	Test II
14	Test II		Test II

When the larger of the two sets of values being compared contains no more than 20 values, the Mann-Whitney U test produces a U-value which can be located in tables used to determine significance. However, when the larger of the two sets of values contains more than 20 values, an approximation to the normal distribution is available which produces z-statistics used to determine significance. In this project all sets of dispersion-measurement values contain more than 20 values such that all results from the Mann-Whitney U tests are stated in terms of z-statistics.

All tests are two-tailed tests since no evidence is available indicating an expected direction. The level of significance assumed in this study is 0.05. As a result, the critical region, or the region of rejection of the null hypothesis, is outside the range of z-statistics from -1.96 to 1.96. If the computed z-statistic for a sample comparison is outside this range, it is concluded that the z-statistic differs significantly from what would be expected under the null hypothesis and the null hypothesis is therefore rejected. The null hypothesis and the alternative hypothesis used for the Mann-Whitney U test are discussed in Chapter IV.

Tests After Elimination of Bath Years

If companies that take baths periodically also tend to smooth during intervening time periods, dispersion-measurement values computed without elimination of the bath years may be confounded by this information. In order to allow for this possibility, the time-series data for companies identified by Method A

and by Method B is adjusted and tests are performed for smoothing patterns both before and after elimination of bath years.

As indicated in the selection methodology, all Method A selection variables are identified for both the Method A sample and the Method B sample during the period 1967-1976 by examination of NAARS printouts, annual report microfiche files, and Form 10-K microfiche files. Method A sample members are originally selected by reference to the period 1973-1976 and each company has at least one bath year during that period. Each company may or may not have other bath years during the period 1967-1972, but all bath years are identified. For the Method B sample the assumption is made that sample members have bath years during those years in which income before extraordinary items and discontinued operations is below the lower confidence limit for the period 1973-1976. In addition, all years in which Method B sample members have Method A selection variables are identified by reference to annual report and Form 10-K microfiche files.

For each company in the Method A and the Method B samples, all bath years are identified for the period 1967-1976. Then dispersion-measurement values are computed and comparisons are performed both before and after elimination of the bath years for each company from the set of observations for each of the 14 selected variables. The procedures described in the flow charts in Figure 3.4. and in Figure 3.5. are applied, therefore, both before elimination of the bath years and after elimination of the bath years.

Summary

In this chapter the research design used to test bath and non-bath companies for smoothing patterns is presented. Description of the methodology is basically divided into two sections. These sections are (1) selection of two possible bath company samples and a control group, and (2) tests for smoothing patterns.

The population of companies considered for selection is limited to companies on the New York and American stock exchanges during the period 1973-1976 and on the annual Industrial Compustat tape during the period 1967-1976. Data used in performance of this study is obtained from Compustat files, National Automated Accounting Research System files, annual report microfiche files, and Form 10-K microfiche files.

Bath companies are identified in two ways called Method A and Method B. Under Method A, companies in the population disclosing certain variables considered to be bath items during the period 1973-1976 are identified. Bath items are defined as certain write offs or write downs and/or certain provisions for estimated future expenses that decrease income before extraordinary items and discontinued operations or increase a loss before extraordinary items and discontinued operations by 10 percent or more. After identification, 50 of these companies are selected for the Method A sample.

Under Method B, sample members must meet two requirements. First, each company must have one or more years during the period 1973-1976 in which its reported income before extraordinary items and discontinued operations is below the lower 90 percent confidence

limit computed for that income series. Second, each company must have evidence of the use of Method B selection variables during the period 1967-1976. From the set of possible companies, 50 are selected for the Method B sample.

The control group (comprised of non-bath companies) is selected from those companies not identified as either Method A or Method B sample members. From these companies, 50 are selected for the control group.

The test procedure for smoothing patterns is designed to gather empirical evidence regarding the time-series properties of 14 selected variables for both bath and non-bath companies. For each selected variable, 50 dispersion-measurement values for bath companies within each of two groups and 50 for the control group (non-bath companies) are calculated and statistically compared. The test procedure is utilized for dispersion-measurement values computed by use of coefficients of variation as well as independently for dispersion-measurement values computed by use of the mean absolute percentage deviation of the actual changes in a variable from its trend. These computations and comparisons are performed independently for both Method A companies and Method B companies. In addition, sets of values for the Method A sample are compared to sets of values for the Method B sample for each of the 14 variables.

One of the objectives of this study is to develop methodology that has the potential to identify bath companies that do not disclose bath items, but may disguise them. The Method B sample is designed to do so. The assumption is that starting in 1973 companies have the

incentive to disguise bath items due to pronouncements of the APB, the FASB, and the SEC. These pronouncements reduce the number and the kinds of items that can be treated as extraordinary as well as expand the disclosure requirements for extraordinary items.

CHAPTER IV

HYPOTHESES AND RESULTS

The objective of this chapter is to report the results of the application of the methodology. The chapter is divided into four general sections used in reporting these results. These sections are the hypotheses tested, the results of the selection of the three samples, the results of the tests for smoothing patterns, and the tests of the data bases. Finally, a summary of the chapter is provided at the end.

Hypotheses

The third methodological phase is to test the hypotheses that there are statistical differences between the sets of dispersion-measurement values for each of the two possible bath company samples and the sets of dispersion-measurement values for the control group for the 14 variables, as well as to test for differences between the sets of values for the two possible bath company samples for the 14 variables. The general null hypothesis used to test for differences is:

H_o: There are no significant statistical differences between the dispersion around trend lines for selected aggregate financial variables for bath companies and the dispersion around trend lines for selected aggregate financial variables for non-bath companies.

The general alternative hypothesis is:

H_1: There are significant statistical differences between the dispersion around trend lines for selected aggregate financial variables for bath companies and the dispersion around trend lines for selected aggregate financial variables for non-bath companies.

Since no evidence is available indicating an expected direction, the test is two-tailed and differences in either direction (greater or smaller) are detected.

In order to gather evidence regarding the general hypothesis, 12 sub-hypotheses are tested. Dispersion-measurement values are computed and grouped into sets of values as discussed in Appendix C. These sets of values are tested for statistical differences using the 12 sub-hypotheses. These hypotheses are shown in Table 4.1. It can be seen that sets of values for the Method A sample are compared to sets of values for the control group for each of the 14 variables under both Test I and Test II procedures, sets of values for the Method B sample are compared to sets of values for the control group for each of the 14 variables under both Test I and Test II procedures, and sets of values for the Method A sample are compared to sets of values for the Method B sample for each of the 14 variables under both Test I and Test II procedures. These comparisons are made and the hypotheses tested both before and after elimination of the bath years. All tests are two-tailed in order to allow for differences in either direction.

The statistical technique used to compare two sets of values is a Mann-Whitney U test (76, pp. 116-127). The null hypothesis

Table 4.1. Sub-hypotheses.

Sample Comparisons	Test Procedure	Hypotheses	Variables
Method A ⟷ Control Group	Test I	H_o: $B(A)_i$ and N_i have the same distribution.	i = 1,14
		H_1: $p[b(A)_i > n_i] \neq \frac{1}{2}$	i = 1,14
Method A ⟷ Control Group	Test II	H_o: $B(A)_i$ and N_i have the same distribution.	i = 1,14
		H_1: $p[b(A)_i > n_i] \neq \frac{1}{2}$	i = 1,14
Method B ⟷ Control Group	Test I	H_o: $B(B)_i$ and N_i have the same distribution.	i = 1,14
		H_1: $p[b(B)_i > n_i] \neq \frac{1}{2}$	i = 1,14
Method B ⟷ Control Group	Test II	H_o: $B(B)_i$ and N_i have the same distribution.	i = 1,14
		H_1: $p[b(B)_i > n_i] \neq \frac{1}{2}$	i = 1,14
Method A ⟷ Method B	Test I	H_o: $B(A)_i$ and $B(B)_i$ have the same distribution.	i = 1,14
		H_1: $p[b(A)_i > b(B)_i] \neq \frac{1}{2}$	i = 1,14
Method A ⟷ Method B	Test II	H_o: $B(A)_i$ and $B(B)_i$ have the same distribution.	i = 1,14
		H_1: $p[b(A)_i > b(B)_i] \neq \frac{1}{2}$	i = 1,14

Symbols used:

$B(A)_i$ = set of Method A sample values for variable i.

$b(A)_i$ = one value from set of Method A sample values for variable i.

$B(B)_i$ = set of Method B sample values for variable i.

$b(B)_i$ = one value from set of Method B sample values for variable i.

N_i = set of non-bath sample values for variable i.

n_i = one value from set of non-bath sample values for variable i.

Table 4.1. (continued)

i = variable 1 through 14.

p = probability of occurrence of an event.

under the Mann-Whitney U test is that two sets of values have the same distribution. Since the tests are two-tailed, the alternative hypothesis is that the probability of a value from one of the sets of values being greater than a value from the other set of values is not equal to $\frac{1}{2}$. The Mann-Whitney U test is basically a ranking test in which the rankings of the values in one group are compared to the rankings of the values in the other group to determine if one group has higher rankings, on the average, than the other.

Results of the Sample Selection Procedures

Application of the methodology discussed in Chapter III results in the selection of the three samples. The members of these samples are given in Appendix D. Members of the Method A sample are given in Table D.1., members of the Method B sample are given in Table D.2., and members of the control group are given in Table D.3.

Evaluation of the Sample Selection

The purpose for selection of the samples is to enable conclusions to be drawn regarding the population. Selection of the samples should be a random process in order that the samples be statistically representative of the population of which they are a part. It is important to note that the three samples drawn in this study are not randomly drawn, and as a result of this violation of statistical assumptions, the tests for smoothing patterns may be biased to some extent.

The Method A sample is selected from companies having bath items during the period 1973-1976 due to the limited data available

through the NAARS system. Companies having bath items during the period 1967-1972 are not subject to selection unless they also have bath items during the period 1973-1976. It is not feasible to examine the annual reports for all companies in the population during the period 1967-1972, and as a result, only companies with bath items during the period 1973-1976 are subject to selection. To the extent that companies with bath items during the period 1973-1976 differ from those with bath items during the period 1967-1972, the results may be biased in an unknown manner.

The Method B companies and the control group all have incomes before extraordinary items and discontinued operations that are fitted with significant regression models. Only two models, a linear regression model and a mean/standard deviation model, are used in this study. As a result, companies whose income series cannot be fitted with significant linear regression models, but whose income series can be fitted by other models, are not subject to selection and are not included in the sample. If the companies whose income series can be fitted with linear regression models have characteristics which differ from those of other companies, the samples may not be representative of the population.

The parameters of the models used to fit the incomes and the plant assets for all companies in the three samples are summarized in Table 4.2. For the Method A sample, it can be seen that 22 of the companies have income series that are fitted with significant linear regression models while 28 do not; these companies are fitted with mean/standard deviation models. However, the Method B sample and the control group have income series that are all fitted with

Table 4.2. Summary of the model parameters.

Sample	Variable	Regression Models		Durbin-Watson D statistics	
		+Not Significant	Significant	No Significant Autocorrelation	Significant Autocorrelation
Method A	Income*	28	22	9	13
Method B	Income*	0	50	50	0
Control	Income*	0	50	19	31
Method A	Plant Assets	10	40	16	24
Method B	Plant Assets	0	50	17	33
Control	Plant Assets	0	50	9	41

* Income before extraordinary items and discontinued operations.

+ These companies fitted with mean/standard deviation models.

significant regression models. For plant assets, it can be seen that the Method A sample has 40 companies fitted with significant regression models while 10 companies are fitted with mean/standard deviation models. The plant assets for the Method B sample and the control group are all fitted with significant regression models.

These results indicate the importance of the consideration of the methods of selection in interpretation of the results. The Method A sample is selected by identifying companies with possible bath items during the period 1973-1976 and no consideration is given to whether or not these companies have incomes before extraordinary items and discontinued operations that can be fitted with significant regression models. The Method B sample and the control group are selected by identifying companies whose incomes before extraordinary items and discontinued operations can be fitted with significant regression models. As a result, the selection methodology may automatically identify companies for the Method B sample and the control group with smooth income streams while permitting the identification of companies for the Method A sample with greater fluctuations in earnings.

Method A Selection Variables

A variety of write downs, write offs, and provisions are identified that meet the criteria for bath items established in this study. These items are similar to those used in identifying bath companies through the NAARS system due to the methodological design. In order to indicate the general nature of the actual possible bath items identified, however, a list is given in Appendix B. The items

which are disclosed by the sample companies during the period 1973-1976 are identified by the NAARS system using the terms in Appendix A and, as a result, are very similar to these items. The items disclosed during the period 1967-1972 are identified by reference to the annual reports of the sample companies, but are also very similar to the items in Appendix A due to the comprehensive nature of this compilation of possible bath items.

One important observation can be made regarding the kinds of bath items found during the period 1967-1976 and changes in the nature of those bath items. As discussed in Chapter III, the criteria for reporting extraordinary items before the effective date of Opinion No. 30 (4) (September 30, 1973) are different from the criteria for reporting extraordinary items after the effective date of this Opinion. Before the effective date, bath items (often reported as extraordinary items) were basically subject to the criteria issued under Opinion No. 9 (3) for extraordinary items. After the effective date the criteria for reporting extraordinary items changed and new requirements were established for the reporting of discontinued operations.

The implication of this observation is that before Opinion No. 30 there are a greater variety of reported bath items since more items could be treated as extraordinary. Since Opinion No. 30 fewer items can be treated as extraordinary resulting in fewer bath items in this category. Remaining bath items (those not treated as extraordinary) are now either treated as a line item in the income statement or are buried in aggregate financial statement categories with or without disclosure. Since only more material items are given line item treatment, the result is that most bath items are buried in

financial statement categories. Thus the reporting of bath items has tended to shift from treatment as extraordinary to footnote disclosure.

Another consideration of importance in the reporting of bath items is the current treatment of discontinued operations set forth in Opinion No. 30. Discontinued operations must now be reported separately from continuing operations in a separate section of the income statement. In addition, any gain or loss from disposal should be estimated and reported along with the related results of discontinued operations and not as an extraordinary item. As a result, companies now tend to aggregate items associated with the discontinuance into a single "Provision for Discontinued Operations" placed in the income statement with footnote disclosure as to the items comprising this provision. The footnote disclosure detail varies widely among enterprises. Some are very specific with respect to the items and amounts involved, while others discuss the components of the provision in general terms.

The result of the reporting requirements is that before the effective date of Opinion No. 30 the number and kinds of items associated with discontinuances that were reported tended to be greater while after the effective date these items tend to be aggregated into the provision and less detail provided as to the nature of these items. From the standpoint of this study, the difficulty of selection of bath companies is increased. It is difficult to determine if the disposal of a segment is discretionary or if it occurs due to economic conditions beyond control of the company. Timing of the disposal may be important in this determination since enterprises do

generally have some discretion in the decision as to when an operation should be discontinued. In addition, there is a tendency for firms to dispose of unprofitable or marginal operations in periods of economic difficulty (either firm-specific or general economic difficulty). Such discontinuances lead to future increased earnings and it may be reasonable to expect firms to discontinue operations at the time perceived to be most advantageous to them.

Results of the Tests for Smoothing Patterns

After selection of the samples, the tests for smoothing patterns are performed and the results are reported in this section. The tests for smoothing patterns consist of a series of statistical comparisons between a set of dispersion-measurement values for one of the two bath company samples and a set of dispersion-measurement values for the control group for each of the 14 selected variables. Dispersion-measurement values are computed by two different procedures and the tests for smoothing patterns are performed independently for each of these two procedures.

Tests Before Elimination of Bath Years

These tests are performed by using the Compustat tape (52), the SAS 76 statistical test package (12), a mean absolute percentage change program, and a Mann-Whitney U test program. The necessary data for all of the variables during the period 1967-1976 is retrieved from the Compustat tape. This data is utilized by the SAS 76 test package in computation of dispersion-measurement values for the Test I procedures. It is also utilized in the mean absolute percentage

change program to compute values for the Test II procedures. Finally, the dispersion-measurement values computed under Test I and Test II procedures are used as inputs to the Mann-Whitney U test to calculate the z-statistics used to test the hypotheses.

A difficulty that has to be dealt with in performing these tests is the problem of missing data on the Compustat tape. There are five variables for which certain companies have missing data points. These are:

1. Selling, general, and administrative expenses;
2. Fully diluted earnings per share;
3. Restated primary earnings per share;
4. Restated income before extraordinary items and discontinued operations; and
5. Dividends per share.

The number of companies with missing data points and the number of missing data points per company is quite small. As a result, this problem is not considered serious. When performing the regression model computations, it is only necessary to indicate in the SAS 76 program the companies that have missing data and the years that are missing; the best regression model is then estimated. In computing the mean absolute percentage deviations, however, the yearly percentage changes are calculated by dividing successive yearly ending balances. Elimination of one data point eliminates two percentage change computations around that point. In order to compensate for this problem, missing data points are eliminated and the observations before and after the missing point are used in calculating one percentage change.

The results of the tests performed before elimination of bath years are given in Table 4.3. Columns one and two represent the results from the comparisons of the Method A sample and the Method B sample to the control group using the Test I procedures. Columns three and four represent the results from the comparisons of the Method A sample and the Method B sample to the control group using the Test II procedures.

Method A Sample

The results for the Method A sample are shown in columns one and three. From examination of this table it can be seen that basically all of the income variables (variables 4-9), as well as the taxes variable (variable 10), have significant z-statistics. These results indicate that in each of these cases the set of values for the Method A sample is statistically different from the corresponding set of values for the control group. In all cases in which there is a significant relationship, the set of values for the Method A sample is ranked statistically greater than the set of values for the control group. This indicates that the dispersion-measurement values for the Method A sample are greater than those for the control group on the average in the statistically significant cases.

With the exception of two variables, all other variables have insignificant z-statistics. For dividends per share, the Method A sample has a significant value when computed under the Test I procedures, but not as computed under the Test II procedures. For selling, general, and administrative expenses, the Method A sample has a significant value when computed under the Test II procedures, but not as computed under the Test I procedures.

Table 4.3. Results of the comparison of sets of dispersion-measurement values for the Method A sample and the Method B sample to sets of dispersion-measurement values for the control group before elimination of bath years.

Variable	+Test I		+Test II	
	Method A	Method B	Method A	Method B
1. Revenues	0.3033	0.7859	1.8545	0.5998
2. Cost of goods sold	0.7962	1.3271	1.4960	0.1034
3. Selling, general, and administrative expenses	0.4619	0.7174	2.4904*	1.4533
4. Income before special items, extraordinary items, and discontinued operations	5.8322*	3.7916*	6.0805*	4.3328*
5. Income before extraordinary items and discontinued operations	5.6736*	3.4986*	5.7185*	4.4191*
6. Restated income before extraordinary items and discontinued operations	5.5254*	5.1405*	5.5151*	5.0110*
7. Primary earnings per share	5.2462*	1.9647*	5.5013*	3.6193*
8. Restated primary earnings per share	5.3119*	4.7676*	4.4196*	3.9256*
9. Fully diluted earnings per share	5.1428*	2.1302*	5.5151*	3.5710*
10. Taxes	5.3358*	3.3470*	6.1321*	4.0329*
11. Dividends per share	1.9646*	0.4899	0.1746	0.4802
12. Production	0.0015	1.2133	1.1616	0.1655
13. Capital expenditures ratio	0.0207	0.1241	0.0414	0.2137
14. Current ratio	0.2930	0.5205	0.8548	0.4550

* Significant at the 0.05 level.

+ All values are expressed in terms of z-statistics.

Note: In all cases in which there is a significant difference, the set of dispersion-measurement values for the Method A sample or the Method B sample is greater than the set of dispersion-measurement values for the control group.

Method B Sample

The results for the Method B sample are shown in columns two and four. From examination of the table, it can be seen that all of the income variables (variables 4-9), as well as the taxes variable (variable 10), have significant z-statistics. In all cases in which there is a significant relationship, the set of values for the Method B sample is ranked statistically greater than the set of values for the control group. No other variables have significant z-statistics.

Comparison of the Method A and the Method B Samples

An additional step is taken to gather evidence regarding the Method A and the Method B samples. The Method A procedure is designed to select companies disclosing possible bath items while the Method B procedure is designed to select companies that may have been disguising possible bath items. If both samples are comprised of bath companies, the distributions for the 14 variables for the two samples should be similar. The Method A and the Method B samples are therefore compared to each other in the same way that the Method A and the Method B samples are each compared to the control group. The results are shown in Table 4.4. For variables 4-10, the sets of dispersion-measurement values for the Method A sample are significantly greater than those for the Method B sample for both Test I and Test II procedures, while for all other variables there are no significant differences.

Table 4.4. Results of the comparison of sets of dispersion-measurement values for the Method A sample to sets of dispersion-measurement values for the Method B sample before elimination of bath years.

Variable	+Test I	+Test II
1. Revenues	0.2275	1.1651
2. Cost of goods sold	0.3516	1.3581
3. Selling, general, and administrative expenses	1.2178	0.9789
4. Income before special items, extraordinary items, and discontinued operations	3.7572*	3.6331*
5. Income before extraordinary items and discontinued operations	3.6435*	3.0162*
6. Restated income before extraordinary items and discontinued operations	2.2781*	2.4670*
7. Primary earnings per share	4.1778*	3.3918*
8. Restated primary earnings per share	2.2606*	2.6805*
9. Fully diluted earnings per share	3.9916*	3.2988*
10. Taxes	3.5263*	3.6503*
11. Dividends per share	1.4837	0.6892
12. Production	1.1237	1.2340
13. Capital expenditures ratio	0.3688	0.2172
14. Current ratio	0.0241	0.5170

* Significant at the 0.05 level.

+ All values are expressed in terms of z-statistics.

Note: In all cases in which there is a significant difference, the set of dispersion-measurement values for the Method A sample or the Method B sample is greater than the set of dispersion-measurement values for the control group.

Tests After Elimination of Bath Years

The last step in the analysis of the data is to identify all possible bath years for all companies that have such years and to reapply the methodology after elimination of these years from the data. All possible bath years for the Method A sample and the Method B sample are identified during the sample selection procedures (as shown in the flow charts presented in Chapter III). Members of the control group have no such years.

These years are eliminated from the set of data for each company and the methodology discussed previously is again utilized to analyze the samples with respect to the 14 variables. The results are given in Table 4.5.

The problem of missing data is present in this stage of the analysis as well as in the previous analysis performed before elimination of the bath years. In addition, since the bath years are eliminated in this stage, the problem is increased. The missing data and the eliminated bath years are handled in the same manner as missing data is handled in the previous analysis. When performing the calculations under the Test I procedures, the bath years and the years in which data is missing are identified and eliminated and the regression models are estimated using the available data observations. Under the Test II procedures the bath years and the years in which data is missing are identified and eliminated and percentage changes are calculated by utilizing the data observations before and after the eliminated observations.

Table 4.5. Results of the comparison of sets of dispersion-measurement values for the Method A sample and the Method B sample to sets of dispersion-measurement values for the control group after elimination of bath years.

Variable	+Test I		+Test II	
	Method A	Method B	Method A	Method B
1. Revenues	0.8066	0.9962	2.2026*	1.4753
2. Cost of goods sold	1.1685	1.0996	1.8889	0.9548
3. Selling, general, and administrative expenses	0.4447	1.1723	3.3366*	2.6507*
4. Income before special items, extraordinary items, and discontinued operations	4.1708*	0.3757	5.1359*	1.5132
5. Income before extraordinary items and discontinued operations	4.0260*	0.1999	5.0773*	1.3719
6. Restated income before extraordinary items and discontinued operations	4.2707*	0.6929	4.7464*	1.3271
7. Primary earnings per share	2.9575*	0.0620	4.3845*	1.4684
8. Restated primary earnings per share	4.0837*	0.8313	4.1676*	0.5791
9. Fully diluted earnings per share	2.9230*	0.2137	4.1570*	1.3546
10. Taxes	3.6744*	0.2895	5.6185*	2.0302*
11. Dividends per share	0.0568	0.3289	1.9312	1.2921
12. Production	0.7790	1.6856	0.9238	1.0651
13. Capital expenditures ratio	0.2723	0.3033	0.3137	0.0103
14. Current ratio	0.1723	0.0655	0.6756	0.2654

* Significant at the 0.05 level.

+ All values are expressed in terms of z-statistics.

Note: In all cases in which there is a significant difference, the set of dispersion-measurement values for the Method A sample or the Method B sample is greater than the set of dispersion-measurement values for the control group.

Method A Sample

As before, the results for the Method A sample are given in columns one and three. It can be seen that under the Test I procedures all of the income variables (variables 4-9) and the taxes variable (variable 10) have significant z-statistics, while all other variables have insignificant values. In addition, the z-statistics computed after elimination of bath years are smaller than the z-statistics computed before elimination of bath years in all cases in which there is a significant value. This indicates that removal of bath years also reduces the variability around the variable trend lines.

Under the Test II procedures the income variables (variables 4-9) and the taxes variable (variable 10) also have significant z-statistics. In addition, the z-statistics computed after elimination of bath years are smaller than the z-statistics computed before elimination of bath years for these seven variables. Two of the remaining seven variables also have significant z-statistics. These variables are the revenues variable and the selling, general, and administrative expenses variable.

Method B Sample

The results for the Method B sample are shown in columns two and four. Under the Test I procedures no comparisons for any of the 14 variables have significant z-statistics. Elimination of the bath years, therefore, reduces the dispersion around the variable trend lines to such an extent that no significant differences remain.

Under the Test II procedures all variables with the exception of two have insignificant z-statistics. The selling, general, and administrative expenses variable and the taxes variable have significant z-statistics.

Comparison of the Method A and the Method B Samples

The Method A sample and the Method B sample are again compared to each other for the 14 variables; the results are shown in Table 4.6. As before, the z-statistics for variables 4-10 indicate significant differences between the Method A and the Method B samples in that the sets of values for the Method A sample are significantly greater than the sets of values for the Method B sample in all cases. The remaining variables all produce insignificant z-statistics. This is true under both Test I and Test II procedures.

Tests of the Accuracy of the Data Bases

Compustat Tape

There is some evidence that there may be errors in the Compustat files (for example, see 69 and 72). In this study the Compustat tape is the main source of financial information; it is relied on to a great extent in identifying the Method B sample and the control group and in performing the tests for smoothing patterns. Since the results obtained and the conclusions reached in this study are dependent on the accuracy and reliability of the financial data contained in the Compustat files, certain tests are performed to validate this information.

Table 4.6. Results of the comparison of sets of dispersion-measurement values for the Method A sample to sets of dispersion-measurement values for the Method B sample after elimination of bath years.

Variable	+Test I	+Test II
1. Revenues	0.1275	0.8549
2. Cost of goods sold	0.0414	0.9307
3. Selling, general, and administrative expenses	0.8784	0.5963
4. Income before special items, extraordinary items, and discontinued operations	4.2570*	4.6224*
5. Income before extraordinary items and discontinued operations	4.4260*	4.6982*
6. Restated income before extraordinary items and discontinued operations	3.6743*	4.2225*
7. Primary earnings per share	3.2126*	3.7917*
8. Restated primary earnings per share	4.0157*	4.1921*
9. Fully diluted earnings per share	3.0299*	3.4367*
10. Taxes	4.0846*	4.7706*
11. Dividends per share	0.1435	0.9133
12. Production	0.9962	1.9476
13. Capital expenditures ratio	0.0414	0.3895
14. Current ratio	0.3861	0.4067

* Significant at the 0.05 level.

+ All values are expressed in terms of z-statistics.

Note: In all cases in which there is a significant difference, the set of disperion-measurement values for the Method A sample or the Method B sample is greater than the set of dispersion-measurement values for the control group.

The basic test is to select a sample of companies from the companies comprising the Method A sample, the Method B sample, and the control group and to compare the data for selected variables for this sample from the Compustat tape to the annual report and Form 10-K microfiche files. These comparisons are performed for data during the period 1972-1976. Five percent of the 150 companies (eight companies) and four of the 14 variables are chosen to use in these tests. The companies chosen are shown in Table 4.7. The variables selected are as follows:

1. Income before extraordinary items and discontinued operations;
2. Primary earnings per share;
3. Selling, general, and administrative expenses; and
4. Current ratio.

The companies are chosen randomly, while the variables are judgementally selected. Two income variables and two nonincome variables are chosen for the tests.

The first step is to prepare a printout consisting of the values contained in the Compustat files for the four variables for the eight companies during the period 1972-1976. The values in this printout are then traced to the corresponding values in the annual report and Form 10-K microfiche files.

The Compustat tape was developed by Investors Management Services, Inc. (IMS). IMS indicates that their data collection and validity procedures are highly reliable and efficient and that there are several checks implemented within their system to ensure accurate

Table 4.7. Companies used in tests of the accuracy of the Compustat data base.

Company	Industry	Sample
Olin Corp.	Chemicals and Allied Products	Method A
Bulova Watch Co., Inc.	Watches, Clocks and Parts	Method A
Quacker Oats Co.	Food and Kindred Products	Method B
Champion International Corp.	Lumber and Wood Products	Method B
Sunbeam Corp.	Household Appliances	Method B
Upjohn Co.	Drugs	Control
Kennametal Inc.	Miscellaneous Primary Metal Products	Control
Hobart Corp.	Machinery--Industrial	Control

data (52, Section 6). The financial data is taken from the source documents and placed on input sheets which are subject to check. After input into the system, various computer output reports are prepared which also are subject to validity checks. Finally, the tapes are checked by computer programs that identify unusual items on the tape that may be errors or mistakes. As long as the control procedures are followed the data on the Compustat tape should be accurate and reliable.

The main data sources used by IMS for the annual tape are annual reports and Form 10-K's. The annual report is considered to be a preliminary source of information with the Form 10-K considered to be the final source of information. Other sources are also used, such as dividend records and telephone contact. The general policy of IMS is not to restate the annual data. There are, however, six items on the tape restated for acquisitions and/or accounting changes for up to 10 years.

The main difficulty that arises in verification of the data is to properly aggregate or disaggregate the data found in the annual reports and Form 10-K's to match the data contained on the Compustat tape. This procedure requires utilization of the Compustat data definitions in performing this reconciliation (52, Section 8). Since IMS maintains informal company contacts in order to gather some financial information not disclosed in the annual reports and Form 10-K's and assigns industry specializations to its analysts, it is not possible to completely reconcile certain Compustat variables from the information provided in the annual reports and Form 10-K's.

The results of the analysis are that no substantive errors are found. The variable presenting the most difficulty in reconciliation is income before extraordinary items and discontinued operations since it is necessary to identify various financial statement data items and to perform calculations to obtain the Compustat values. Selling, general, and administrative expenses and primary earnings per share present some difficulty, with the current ratio being the easiest variable to reconcile. It is concluded that the Compustat tape can be relied on as a data source. Substantive errors that can affect the results of the study are not found, and it appears that the validity procedures followed by IMS are adequate to prevent errors. Other researchers have also drawn similar conclusions (for example, see 25).

NAARS Files

Great reliance is placed on the NAARS files in identifying possible bath items in order to select the Method A sample. In order to test for errors in the NAARS files that are of importance in this selection process, the output contained in the NAARS printouts for the Method A sample companies relating to the possible bath items discovered is compared to the annual report microfiche files during the search for additional possible bath years. No errors are found during this procedure and it is concluded that if there are errors in the files, they do not bias the results of the selection of the Method A sample.

Summary

The results of this study are presented in this chapter. The chapter is divided into four sections. These are the hypotheses tested, the results of the sample selection process, the results of the tests for smoothing patterns, and the results of the tests of the data bases. Within this framework, the evidence gathered during the course of the research project available to sustain the assertion that bath companies tend to smooth income more than non-bath companies is developed. This evidence is obtained by selection of bath and non-bath company samples and by analysis of the dispersion around assumed trend lines for 14 selected variables for these samples.

The results indicate that there are differences between the properties of the bath company samples and those of the control group. Before elimination of the bath years there are statistically significant differences between the sets of dispersion-measurement values for each of the two bath company samples and the sets of dispersion-measurement values for the control group. These differences occur for the six income variables and the taxes variable used in the study for the most part; few significant differences occur for the remaining seven variables. After elimination of the bath years, there are statistically significant differences between the sets of values for the sample which disclosed bath items (the Method A sample) and the sets of values for the control group for the six income variables and the taxes variable. There are few significant differences for the second bath company sample (the Method B sample). In all cases in

which there is a significant difference, the sets of values for the bath company sample are greater than those for the control group.

In comparisons between the two possible bath company samples, the sets of values for the sample which disclosed bath items (the Method A sample) are significantly greater than the sets of values for the other bath company sample (the Method B sample) both before and after elimination of the bath years. This relationship holds for the six income variables and the taxes variable. There are no other significant statistical differences.

CHAPTER V

CONCLUSIONS AND LIMITATIONS

The two objectives and the three methodological phases of this study are presented in Chapter I. Development of the three methodological phases and discussion of the results of the application of these three phases are presented in Chapters III and IV. Based on the results discussed in Chapter IV, the present chapter contains an evaluation of the two objectives of the study, other conclusions drawn from the results, a summary of the limitations of the study, and suggestions for future research.

The approach of this study is cross-sectional in nature. Data is gathered by the analysis of various income and nonincome series for a number of firms rather than by the analysis of these series for a single firm. As a result, any conclusions reached based on this data should be interpreted only in a general sense. Few conclusions can be reached regarding the time-series properties of specific firms.

The purpose for this approach is to allow greater generalizability of the results. The samples are drawn without any attempt to control for other factors such as risk differences, industry effects, the intensity of capital investment, organizational structures, methods of bonus computations, and so on, since no research on the financial bath has attempted to assess the effects of these factors on the tendency of firms to take baths. This project focuses solely on the assertion that companies taking baths also tend to smooth income during intervening time periods to a greater extent than non-bath companies.

Evaluation of the Objectives

This section deals with the evaluation of the objectives developed in this project. Conclusions are drawn and discussed for the properties of the Method A sample and the Method B sample as contrasted with the properties of the control group, and for the properties of the Method A sample as contrasted with the properties of the Method B sample.

Properties of the Method A Sample

The Method A sample consists of companies that disclose bath items during the period 1973-1976. In Chapter IV it is indicated that before elimination of the bath years all of the sets of dispersion-measurement values for the income variables and the taxes variable for the Method A sample are significantly greater than the corresponding sets of dispersion-measurement values for the income variables and the taxes variable for the control group. The relationships are found for dispersion-measurement values computed under both Test I and Test II procedures. After elimination of the bath years the significant differences are still present, but the z-statistics are smaller, indicating that the differences between the sets of values are not as great.

Other variables for the Method A sample also have significant values. Before elimination of the bath years the dividends per share variable has a significant z-statistic when computed under the Test I procedures, but not when computed under the Test II procedures. The selling, general, and administrative expenses variable has a significant z-statistic when computed under the Test II procedures, but not when

computed under the Test I procedures. After elimination of the bath years, the revenues variable and the selling, general, and administrative expenses variable both have significant z-statistics when computed under the Test II procedures, but not when computed under the Test I procedures.

The significant differences for the income variables and the taxes variable occur consistently under both the Test I and the Test II procedures as well as before and after elimination of the bath years. Strong evidence is provided to support the assertion that there are significant differences for these variables. The other four significant differences do not occur consistently under both test procedures. Since these variables are not consistently significant, little evidence is provided to support the assertion that there are significant differences between the Method A sample and the control group for these three variables.

An important set of dispersion-measurement values are the z-statistics computed after elimination of the bath years. These z-statistics measure the amount of dispersion in a particular series during the intervening periods between bath years. Dispersion-measurement values computed without elimination of the bath years may be contaminated by the presence of such years and the effect of the inclusion of such years on the calculations cannot be ascertained. As a result, the differences found between the Method A sample and the control group after elimination of the bath years are considered to represent the important findings.

These findings suggest that there are significant differences in the properties of the income streams of the Method A companies and

the income streams of the control group. These differences, however, are opposite to the differences asserted in this study. It is asserted that the income streams of companies that take baths are smoother than the income streams of companies that do not take financial baths. In order for this assertion to be supported, it would be necessary for the sets of dispersion-measurement values for the Method A sample variables to be significantly smaller than the sets of dispersion-measurement values for the control group variables. This relationship is not apparent for any of the sets of values in this study.

The reason for this difference may be that companies that take financial baths may also tend to add subsidiaries, divisions, and product lines and to dispose of segments and other operations more often than non-bath companies. Consequently these companies may have more items available to them that can be treated as bath items due to these disposals and discontinuances and thus may have greater opportunity to take financial baths. These additions to and discontinuances of operations may lead to greater fluctuations in the income series.

This conclusion is further supported by the results of the fitting of linear regression models to the plant assets for sample members as shown in Table 4.2. on page 117. For the Method A sample, 10 companies cannot be fitted with significant regression models while 40 companies can be fitted with significant regression models. As a result, it is apparent that the fluctuations in plant assets for the Method A sample are greater than the fluctuations for the other two samples indicating greater numbers of additions to and discontinuances of operations for the Method A sample.

Properties of the Method B Sample

In Chapter IV it is indicated that before elimination of the bath years all of the sets of dispersion-measurement values for the income variables and the taxes variable for the Method B sample are significantly greater than the corresponding sets of dispersion-measurement values for the income variables and the taxes variable for the control group. These relationships are found for values computed under both Test I and Test II procedures. No other significant differences (for other variables) are identified under either test procedure.

After elimination of the bath years, there are only two significant differences between the sets of values for the Method B sample and those for the control group under both the Test I and the Test II procedures. Under the Test I procedures there are no significant differences. Under the Test II procedures, however, the selling, general, and administrative expenses variable and the taxes variable both have significant z-statistics. Since these variables are not consistently significant, little evidence is available to support the assertion that there are significant differences between the Method B sample and the control group for these two variables. As discussed earlier in this section, the important z-statistics may be those computed after elimination of the bath years. The conclusion is, therefore, that there is inadequate evidence to support the assertion that significant differences exist between the Method B sample and the control group for any of the variables.

Comparison of the Method A and the Method B Samples

In Chapter IV the results of the comparisons between the Method A sample and the Method B sample for the 14 variables are provided. In Table 4.4. (page 126) and Table 4.6. (page 131), the results indicate that there are significant differences between the sets of values for the Method A sample and those for the Method B sample. These differences exist for all of the income variables and the taxes variable for values computed under both Test I and Test II procedures in that the sets of values for the Method A sample are greater than those for the Method B sample in all significant cases. These relationships are found both before and after elimination of bath years. There are no other significant z-statistics computed under either test procedure either before or after elimination of the bath years.

Conclusions

It is important to emphasize that all results obtained and all conclusions drawn are tentative and are subject to the limitations inherent in the design of this project. The most important limitations are summarized in the following section of this chapter and the effects of these limitations must be evaluated before the validity attached to these conclusions can be addressed. The conclusions can be summarized as follows:

1. For the Method A sample the evidence indicates that the sets of dispersion-measurement values for the income variables and the taxes variable are significantly greater than the corresponding sets of values for either the Method

B sample or the control group both before and after elimination of the bath years. For the remaining seven variables there is inadequate evidence to support the assertion that there are any significant differences between the Method A sample and either the Method B sample or the control group. It is concluded that the income streams of bath companies may have different properties than the income streams of non-bath companies.

2. For the Method B sample the evidence indicates that there are significant differences between the sets of dispersion-measurement values for the income variables and the taxes variable and the corresponding sets of values for the control group before elimination of the bath years. However, after elimination of the bath years there is inadequate evidence to support the assertion that there are any significant differences between the sets of values for the Method B sample and those for the control group. Since the evidence available after elimination of the bath years may be more reliable than the evidence available before elimination of the bath years, it is concluded that there may be no significant differences between the sets of values for the Method B sample and those for the control group.

3. The income streams of bath companies during the intervening periods between the bath years are found to be more volatile than the income streams of non-bath companies. Since the income streams for non-bath companies are found

to be smoother than the income streams for bath companies, no evidence is available to support the assertion evaluated in this project.

4. Bath companies add and discontinue operations more than non-bath companies providing them with greater opportunity to use the financial bath. As a result, greater fluctuations may be introduced into their earnings streams.

Limitations of the Study

This study is necessarily limited in scope since it is not feasible to consider all possible variables that might affect the results within a single project. It is, therefore, necessary to select the variables of interest and to make assumptions regarding the variables not considered. In addition, the selection of a methodology involves the acceptance of assumptions associated with that methodology. The most important of these limitations are summarized in this section in order to provide an overall perspective.

Identification of Bath Items

A major problem in this project is the identification of bath companies by the identification of possible bath items. Enterprises may fail to disclose bath items in their financial statements. Gains and losses incurred within an enterprise (or incurred by different divisions of an enterprise) may be netted against each other and only the difference presented in the statements, or if the gains and losses offset exactly, may not be disclosed at all. Another important identification problem occurs when a company does not disclose a bath

but buries it in other categories in the income statement. Last, it is difficult to differentiate between a discretionary accounting change and a discretionary change in circumstances (which generates a transaction and a following entry). Such a distinction is useful in differentiating bath items but is often difficult to make based solely on information presented in the financial statements. These problems may lead to failure to properly identify bath companies and the classification of a company incorrectly as a non-bath company.

Lack of Control Over Other Factors

Another limitation is the lack of control for various other factors that may affect the tendency of enterprises to take baths. Other factors of interest may be industry classifications, organizational structures, firm size, firm age, financial health of the firm, methods of bonus computations, stock ownership, and risk levels. Some or all of these factors may be important in influencing the tendency of firms to take baths, but no past research has addressed these variables. Consequently, this research project does not attempt to control for all these factors but focuses entirely on the smoothness of the income streams of bath companies. To the extent that the tendency to take baths is affected by these other factors, the sample selection process and the tests for smoothing patterns may be biased.

Methodological Limitations

The methodological procedures employed produce several limitations. First, the study deals only with firms included on the Compustat tape whose securities are listed on the New York or American

stock exchanges. These firms are generally large firms which presumably are older. In addition, failed firms are not in the files. The findings of this study, therefore, are only generalizable to this limited sample.

Other limitations arise due to the statistical procedures used. Sample selection is not completely randomized. For example, bath companies are selected by reference to the period 1973-1976, and companies with bath items during the period 1967-1972 are not subject to selection unless they also have bath items during the period 1973-1976. Since the statistical tests assume random selection procedures, there is a violation of assumptions whose effects cannot be completely assessed. In order to perform the tests, it is assumed that any biases are small. Test of smoothing patterns using time-series analysis assumes the consistency of behavior and outside influences over time. This assumption may be confounded by the existence of potential exogenous factors that destroy any semblance of consistency and thwart trend analysis. Last, the Test I procedures utilize two models (linear regression models and mean/standard deviation models) while the Test II procedures utilize mean absolute percentage deviations. There may be other models (for example, martingale or moving average models) that would fit the data with fewer violations of statistical assumptions and produce different results.

As discussed in a previous chapter, the selection methodology may automatically identify companies for the Method B sample and the control group with smooth income streams while permitting the identification of companies for the Method A sample with greater fluctuations in earnings. This limitation is a result of the methods

of selection. The Method A sample is selected by identifying companies with possible bath items during the period 1973-1976 and no consideration in sample selection is given to whether or not these companies have incomes before extraordinary items and discontinued operations that can be fitted with significant regression models. The Method B sample and the control group are selected by identifying companies whose incomes before extraordinary items and discontinued operations can be fitted with significant regression models.

Limitations Associated With Use of the NAARS Files

The use of the NAARS system in selecting the Method A sample introduces several selection limitations. First, the system was developed in 1973 and has been in a state of expansion since that time. The system currently includes nearly all New York and American stock exchange companies, but when first developed, fewer companies were included. This limitation is not considered to be major. Since it is not feasible to search the entire population for bath companies by examining all annual reports for a number of years, the advantages in using the NAARS system far outweigh this limitation.

Another possible problem is the use of key words or phrases in accessing the NAARS system. It is necessary to develop a list of key words or phrases to be used in identification of possible bath companies. To the extent that this list is incomplete and does not include certain key words or phrases describing other possible bath items, the identification of possible bath companies in the population is incomplete and sample selection is biased. Great care was taken, however, in the compilation of the list of possible bath items. The

related literature was searched extensively for descriptions of possible bath items. It is felt that the list is quite comprehensive and that few items have been overlooked.

Another difficulty associated with use of the NAARS system is that input of a key word or phrase results in the identification of all annual reports containing that key word or phrase regardless of the context in which that key word or phrase is used. This results in the identification of many annual reports which do not contain possible bath items, but which nevertheless have to be examined before rejection. Despite this difficulty, the NAARS system allows a great volume of data to be analyzed in a reasonable period of time which otherwise would not be possible.

Motivation of Firm Management

The design of this study does not allow conclusions to be drawn regarding the motivations and intentions of company managements. This study deals only with the financial data available after any smoothing attempts or bath activities have occurred and makes no attempt to imply motivation. When income smoothing and financial baths occur, there may be explanations for these results other than that of discretionary management actions.

Role of the Auditor

This study also does not address the role of the auditor in income smoothing and in the financial bath. Since the use of bath items and income smoothing variables may involve discretionary actions on the part of management, the auditor may attempt to limit

management's use of these activities through negotiation. The auditor may do so in an attempt to obtain less-biased financial information even though generally accepted accounting principles may permit these practices.

Suggestions for Future Research

During the performance of this study several topics are identified that could provide additional areas for investigation for those researchers interested in doing further work in the areas of the financial bath and income smoothing. Since the emphasis of this project is on the identification of bath companies and the investigation of one of their properties (the smoothness of the trend lines for 14 selected variables), these suggestions are mainly devoted to further investigation of the financial bath and the conditions under which it commonly occurs.

Use of the NAARS Files

An important aspect of this study that should be considered by other researchers is the use of the NAARS files. This data base allows a great volume of information to be searched efficiently and effectively by use of key words or phrases. Use of this system provides a degree of flexibility and accuracy in searching the information in annual reports that was previously not available and permits the performance of research projects not otherwise feasible.

The NAARS system provides access to a data base of a different nature than Compustat files. The Compustat tapes provide numerical values for a number of variables commonly found in financial

statements and provide a means by which numerical calculations of various kinds can be performed. However, limited access is provided (through a coding system) to the disclosures in the financial statements. The NAARS files, on the other hand, provide access to all of the disclosures found in financial statements, but do not allow for the performance of numerical calculations. These two data bases complement each other, therefore, and permit the expansion of the scope of research projects in a manner similar to that used in this project. That is, the entire population can be searched in order to identify companies with certain characteristics (by the use of the NAARS files) and a great volume of calculations can be performed for these companies by use of Compustat tapes.

Other Characteristics of Bath Companies

Since little research has been devoted to the financial bath, there are many properties of bath companies that remain to be investigated. For example, little is known about how often companies tend to take baths and how many companies in a given year take baths. Other important characteristics may be size, organizational structure, stock ownership, age, financial health of companies at the time of the bath, industry classifications, and risk levels. These factors can be evaluated by using the Method A sample and the control group developed in this study.

One of the most important of these factors that should be considered for additional research is the risk level. In this study it is found that the fluctuations in the income streams for the bath companies are significantly greater than the fluctuations in the

income streams for the non-bath companies. Since there is some evidence that accounting-based risk measures tend to be impounded in market-based risk measures (for example, see 15 and 43), the levels of risk associated with bath companies may be greater than the levels of risk associated with non-bath companies. This possibility may be evaluated by computation of beta coefficients for the companies in the bath and non-bath samples and by testing these sets of beta coefficients for significant differences.

Other factors may also be important. For example, bath companies may tend to be large companies since large companies with many subsidiaries and divisions may have a greater number of potential bath items available. They may also tend to be companies in financial difficulty since these companies may have unprofitable or marginally profitable segments and operations that could result in bath items. In addition, the type of control (owner-control versus manager-control) may be important in that the managements of publicly-held companies may have greater incentive to attempt to manage the income streams and the stock prices. Furthermore, the methods of bonus computations may be important if they provide management with the incentive to attain a smooth income stream or to artificially increase income. There may also be an industry effect in that enterprises in certain industries may be more likely to take baths than enterprises in other industries.

Motivation of Firm Management

Another topic that should be addressed is the motivations and intentions of firm management with respect to the financial bath and

income smoothing. Even if managements do attempt to manage income, they may not smooth or take baths; there may be alternative explanations for their actions (such as the desire for income maximization). In addition, when smoothing and the bath do take place, these actions may not be the result of discretionary management decisions. They may have other explanations.

Research in the area of motivation would involve a search for behavioral evidence. The strategies that would be useful are observational studies of management actions and laboratory experiments using managers as experimental subjects. Many kinds of evidence can be gathered. For example, the effects of smoothing and the bath on the perceptions of investors and creditors can be analyzed to determine if these actions produce positive or negative results from the standpoint of firm management. The reward structure of various firms (for example, compensation or promotion policies) can be analyzed to determine if incentives exist for management to produce smoother income streams and to take financial baths.

Roles of the Auditor and of Accounting Standards

The roles of the auditor and of accounting standards should be addressed to determine to what extent accounting standards prevent the performance of such acts and to what extent auditors resist the use of income smoothing and the bath. Even if managements have the incentive to use these techniques, they may be prevented from doing so. For example, the pronouncements of various regulatory authorities can be evaluated to determine the attitude of these bodies towards these actions and whether the opportunities to utilize income

smoothing and the bath have changed over time. Interviews can be conducted with a sample of auditors to determine whether they perceive that these actions are a problem and what they do to resist the use of such techniques. In addition, the results of the interview procedures can be followed up by use of a questionnaire. Research of this nature has the potential to point out deficiencies in current accounting practices.

Summary

The conclusions, limitations, and suggestions for future research are discussed in this chapter. It is concluded that there are significant differences between the income streams for bath companies and the income streams for non-bath companies. In this study the assertion is tested that the income streams for bath companies are smoother than the income streams for non-bath companies. The results of this study indicate that the opposite conclusion must be drawn; the income streams for non-bath companies are smoother than those for bath companies. In addition, bath companies may add and discontinue operations more than non-bath companies providing them with greater opportunity to use the financial bath. Greater fluctuations may be introduced into their earnings streams as a result.

The limitations are summarized in six areas. These areas are (1) problems associated with the identification of bath companies, (2) lack of control over other characteristics of bath companies (such as size and risk), (3) methodological limitations, (4) limitations associated with use of the NAARS files, (5) lack of evaluation

of management motivation, and (6) lack of consideration of the roles of the auditor and of accounting standards. These limitations arise from the research design and influence the results and conclusions. These limitations are not considered to be serious, but they do illustrate the need for additional research in these areas.

The suggestions for future research deal with four areas. First, the value of the NAARS files to other researchers in conducting future research is stressed. Next, additional research should be performed on other characteristics of bath companies such as age, size, industry classifications, and risk levels in order to determine which companies are most likely to take baths. An especially fruitful area for further research may be an analysis of risk using beta coefficients to determine if bath companies tend to be associated with higher risk levels than non-bath companies. Other areas of interest may be an analysis of management motivation by gathering behavioral evidence and an evaluation of the roles of the auditor and of accounting standards.

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APPENDICES

APPENDIX A

LIST OF KEY WORDS AND PHRASES USED TO ACCESS THE NAARS SYSTEM IN THE IDENTIFICATION OF THE METHOD A SAMPLE

General Description of Potential Bath Items

Estimated liabilities
Extraordinary items
Infrequently occurring items
Provisions
Reserves
Unusual items
Write downs
Write offs

Specific Examples of Potential Bath Items

Abandonment, closing, liquidation, disposition, and discontinuance (for example, discontinuance of operations in a segment of a business)
Accounts receivable
Changes in estimates
Claims for damages and injuries
Claims under guarantees and warranties
Disengagement costs in foreign areas
Estimated disposal costs
Exchange or translation of foreign currencies
Extinguishment of debt
Fines or violations (for example, federal or state pollution law violations)
Fire losses
Intangibles
Inventories
Moving, start-up, and relocation
Natural disasters
Obligations under pension plans
Plant, property, machinery, and equipment leased to others
Plant, property, machinery, and equipment used in business (for example, reduction of net costs of production facilities to their estimated benefits to future operations)
Research and development costs
Sale and exchange of interest in associated companies and joint ventures

Securities and investments
Settlement of contracts
Settlement of lawsuits or litigation (such as antitrust actions)
Settlement of various liabilities or commitments
Subsidiaries, affiliates, divisions, and facilities (for example, sale of investment in domestic affiliate, or sale of stock in subsidiaries)

APPENDIX B

SUMMARY LIST OF THE SELECTION VARIABLES IDENTIFIED

IN THE FINANCIAL STATEMENTS OF SAMPLE COMPANIES

Provisions

Anticipated net loss on disposal
Closing of excess plant facilities
Costs and expenses relating to vacated leased manufacturing facilities
Costs and possible losses on pending litigation and claims
Decline in market value of preferred stock investments
Disposition of idle facilities
Estimated costs applicable to termination of lease
Estimated loss on disposal of assets
Estimated losses on disposition of residual inventories
Estimated losses on disposition of several product lines
Estimated losses on production equipment
Facility realignment
Lease settlements
Loss on abandonment
Loss on discontinuance of operations
Loss on disposal of operations
Loss of equipment leased or held for lease
Loss on investments
Loss on tooling and machinery
Losses on idle equipment and facility leases
Overstocked levels of inventories
Phasing out of product lines
Plant phaseout
Plant relocations
Reduction in value of assets
Reorganization of subsidiary
Slow-moving, surplus, and obsolete inventory
Unusual costs involved in updating inventories

Write Downs

Assets to estimated fair market value or salvage value
Domestic and foreign inventories
Equity securities
Excess of cost over equity
Inventory relating to corporate restructuring program
Investments and advances in non-consolidated subsidiaries
Land and recreation facilities
Machinery with marginal utility

Obsolete inventory
Obsolete or uneconomically located plants
Plant and equipment to expected realizable value for phase-out of operations
Recognize permanent loss of utility of unprofitable manufacturing facilities
Segment of the business
Slow-moving inventories to estimated realizable value

Write Offs

Assets related to idle facilities
Cost in excess of net assets of acquired companies
Deferred advertising and training costs
Deferred charges
Deferred engineering costs and related expenses no longer deemed to be recoverable
Deferred marketing expense
Equity interest
Goodwill
Intangibles
Interest in affiliated company
Investment
Obsolete facilities
Patents
Plant and equipment
Product changes
Supply inventories
Tooling costs
Unamortized balance of deferred preoperating expenses
Unamortized patent costs applicable to product line

APPENDIX C

TREND MODELS AND DISPERSION MEASURES

There are three trend models and three measures of dispersion used in this study. These models and measures are used in a variety of ways in selecting the samples and in testing for smoothing patterns. The three trend models are a least-squares, linear regression model; a mean/standard deviation model; and a mean model of the absolute percentage deviation of the actual changes in a variable from its trend. The measures of dispersion are two coefficients of variation (computed either for the regression model or the mean/standard deviation model) and the mean absolute percentage deviation of the actual changes in a variable from its trend. In the sample selection procedures only two of the trend models (the linear regression model and the mean/standard deviation model) are used. In testing for smoothing patterns all trend models and all dispersion measures are used.

The tests for smoothing patterns are performed by using two procedures called Test I and Test II. Under Test I the two trend models used are the linear regression model and the mean/standard deviation model. The dispersion measures used are coefficients of variation computed for each model. Under Test II one trend model is used (the mean model of the absolute percentage deviation) and one dispersion measure is used (the mean absolute percentage deviation). The models and the dispersion measures associated with those models are discussed within the remainder of this section within the context of these two test procedures.

Test I

The two trend models used in this test are the linear regression model and the mean/standard deviation model. The least-squares, linear regression model can be expressed as follows (34):

$$Y_i' = a + bX_i + e_i \qquad \text{(C-1)}$$

$$\sigma_e = \sqrt{\sum_{i=1}^{n} \frac{(Y_i - Y_i')^2}{n - 2}}$$

where Y_i' = predicted income before extraordinary items and discontinued operations in time period i.

Y_i = reported income before extraordinary items and discontinued operations in period i.

X_i = time period i.

a = intercept.

b = slope coefficient.

e_i = residual error in period i.

σ_e = standard error of the estimate.

i = 1967-1976.

n = number of observations.

This model is used to represent a set of observations when the regression coefficient is significant at the 0.05 level. When the regression coefficient is not significant, the model used to represent the set of observations is a mean/standard deviation model. This model is expressed as follows (79, pp. 45,70):

$$\bar{Y} = \frac{\sum_{i=1}^{n} Y_i}{n} \qquad \text{(C-2)}$$

$$\sigma = \sqrt{\sum_{i=1}^{n} \frac{(Y_i - \bar{Y})^2}{n - 1}}$$

where $\bar{Y}$ = mean of reported income before extraordinary items and discontinued operations for the time period.

σ = standard deviation.

Dispersion around the trend line developed in the regression model and the mean computed in the mean/standard deviation model is measured by the computation of coefficients of variation. A coefficient of variation provides a measure of relative dispersion and enables comparisons of two or more enterprises to be made. This is in contrast to a standard deviation or a standard error of the estimate (which provide a measure of absolute dispersion). A coefficient of variation is equal to the standard deviation (or the standard error of the estimate) of a series of data points divided by the arithmetic mean of the observations and commonly expressed as a percentage. The coefficient of variation for a regression line is computed as follows (34, p. 118):

$$\text{Coefficient of Variation (CV)} = \frac{\text{Standard Error of the Estimate}}{\text{Mean of Observations}}$$

$$CV = \frac{\sqrt{\sum_{i=1}^{n} \frac{(Y_i - Y_i')^2}{n - 2}}}{\bar{Y}} \qquad \text{(C-3)}$$

The coefficient of variation for a mean/standard deviation model is computed as follows (79, p. 73):

$$\text{Coefficient of Variation (CV)} = \frac{\text{Standard Deviation}}{\text{Mean of Observations}}$$

$$CV = \frac{\sqrt{\sum_{i=1}^{n} \frac{(Y_i - \bar{Y})^2}{n - 1}}}{\bar{Y}} \qquad (C\text{-}4)$$

The symbols used in equations (C-3) and (C-4) are defined previously.

The dispersion-measurement values are computed using these equations. In computing a dispersion-measurement value for a specific company in one of the three samples for one of the 14 selected variables, the first step is to fit a linear regression model. If that model has a significant regression coefficient, then the coefficient of variation is computed using equation (C-3). If the regression coefficient is not significant, a mean/standard deviation model is fitted and the coefficient of variation is computed using equation (C-4). Coefficients of variation, therefore, are computed for each sample member for each of the 14 selected variables. These 50 coefficients of variation for each sample for a given variable are termed a set of dispersion-measurement values. For each variable, therefore, there are three sets of 50 dispersion-measurement values each (one for each of the three samples). For each sample, there are 14 sets of dispersion-measurement values (one for each variable). A total of 42 sets of 50 dispersion-measurement values are computed under the Test I procedures.

To test for differences, three comparisons are made. The first comparison is to relate a set of 50 values for the Method A sample to the corresponding set of values for the control group for the 14 selected variables. The second is to compare sets of values for the Method B sample and the control group, while the third is to

compare sets of values for the Method A sample and the Method B sample. These comparisons are made using Mann-Whitney U tests.

Test II

Under the Test II procedures the trend model used is a mean model of the absolute percentage deviation of the actual changes in a variable from its trend (56, p. 263). This model is expressed as follows:

$$T = \frac{1}{n-1} \sum_{i=1}^{n-1} Y_{i+1} / Y_i \qquad \text{(C-5)}$$

where T = trend.

The measure of smoothness is the mean absolute percentage deviation of the actual changes in a variable from its trend. The measure is expressed as follows:

$$S = \frac{1}{n-1} \sum_{i=1}^{n-1} \left| \frac{(Y_{i+1} / Y_i) - T}{T} \right| \qquad \text{(C-6)}$$

where S = smoothness measure.

Using these equations, dispersion-measurement values (smoothness measures) are computed for each company in the three samples for each of the 14 selected variables. For each sample, 50 dispersion-measurement values (smoothness measures) are computed for each of the 14 selected variables. As before, therefore, there are three sets of values (one for each of the three samples) for each of the 14 variables for a total of 42 sets of 50 values. Comparisons between the Method A sample and the control group, the Method B sample and the control group, and the Method A sample and the Method B sample are made as discussed under the Test I procedures.

APPENDIX D

Table D.1. The Method A sample.

Company	Industry	C.V.* Plant Assets
Consolidated Foods Corp.+	Food and Kindred Products	3.53
General Foods Corp.	Food and Kindred Products	2.63
Esmark, Inc.	Foods--Meat Packing	12.11
H.J. Heinz Co.	Canned--Preserved Fruits--Vegetables	6.30
Anderson, Clayton and Co.	Fats and Oils	2.72
Central Soya Co., Inc.	Fats and Oils	4.28
The American Distilling Co.	Distilled Rectified Blend Beverages	6.84
Heublein Inc.+	Distilled Rectified Blend Beverages	8.90
Burlington Industries, Inc.	Textile Mill Products	1.82
Cluett, Peabody and Co., Inc.	Apparel and Other Finished Products	8.45
Hanes Corp.	Apparel and Other Finished Products	6.44
Manhattan Industries	Apparel and Other Finished Products	7.74
Warnaco Inc.	Apparel and Other Finished Products	6.18
Mead Corp.	Paper and Allied Products	7.47

Table D.1. (continued)

Company	Industry	C.V.* Plant Assets
Westvaco Co.	Paper and Allied Products	3.92
Gannett Co.	Newspapers: Publishing--Print	10.36
Olin Corp.	Chemicals and Allied Products	9.75
Cabot Corp.+	Miscellaneous Chemical Products	8.77
General Tire and Rubber Co.+	Rubber and Miscellaneous Plastics Products	4.75
The B.F. Goodrich Co.	Rubber and Miscellaneous Plastics Products	5.43
UniRoyal Inc.	Rubber and Miscellaneous Plastics Products	1.69
American Can Co.	Glass Containers	2.71
Anchor Hocking Corp.	Glass Containers	5.46
General Portland Inc.	Cement Hydraulic	9.80
Ameron, Inc.	Concrete Gypsum and Plaster	4.41
Wallace-Murray Corp.	Heating Equipment and Plumbing Fixtures	4.85
Curtiss-Wright Corp.	Machinery--Industrial	9.58
Addressograph-Multigraph	Office Computing and Accounting Machines	2.60
Pitney-Bowes, Inc.	Office Computing and Accounting Machines	6.98

Table D.1. (continued)

Company	Industry	C.V.* Plant Assets
Xerox Corp.	Office Computing and Accounting Machines	7.39
Fedders Corp.	Refrigeration and Service Industrial Machines	7.59
Westinghouse Electric Corp.+	Electrical Machinery Equipment and Supplies	5.73
Scovill Manufacturing Co.	Household Appliances	16.38
The Singer Company	Household Appliances	11.80
International Harvester Co.	Truck and Bus Bodies	2.82
Gateway Industries Inc.	Motor Vehicle Parts--Accessories	18.42
A.O. Smith Corp.	Motor Vehicle Parts--Accessories	4.52
Northrop Corp.	Aircraft and Parts	5.52
Fisher Scientific Co.	Engineering Laboratory and Research Equipment	5.36
Ranco Incorporated	Measuring and Controlling Instruments	13.45
Bell and Howell Co.	Photographic Equipment and Supplies	6.14
Bulova Watch Co., Inc.	Watches, Clocks and Parts	12.00
The Wurlitzer Co.	Musical Instruments	9.47
Brunswick Corp.+	Toys and Amusements, Sporting Goods	8.02

Table D.1. (continued)

Company	Industry	C.V.* Plant Assets
Fuqua Industries, Inc.	Toys and Amusements, Sporting Goods	7.86
Cook United Inc.	Retail--Department Stores	14.35
The Macke Company	Retail--Automotive Merchandising	5.80
Hilton Hotels Corp.	Hotel--Motel	16.60
Avco Corp.	Conglomerates	12.94
Litton Industries Inc.	Conglomerates	8.70

* Coefficient of variation for plant assets.

+ Also a member of the Method B sample.

Table D.2. The Method B sample.

Company	Industry	C.V.* Plant Assets
Consolidated Foods Corp.+	Food and Kindred Products	3.53
Quaker Oats Co.	Food and Kindred Products	3.65
Kraft Inc.	Dairy Products	2.03
Green Giant Co.	Canned--Preserved Fruits--Vegetables	4.04
Joseph Schlitz Brewing	Malt Beverages	12.88
Heublin Inc.+	Distilled Rectified Blend Beverages	8.90
Seagram Co. LTD	Distilled Rectified Blend Beverages	4.63
Royal Crown Cola Co.	Bottled--Canned Soft Drinks	13.91
Collins and Aikman Corp.	Textile Mill Products	8.58
Reeves Brothers Inc.	Textile Mill Products	5.08
Spring Mills Inc.	Textile Mill Products	3.18
Oxford Industries Inc.	Apparel and Other Finished Products	4.86
Champion International Corp.	Lumber and Wood Products	6.62
Avery International	Convert Paper--Paperboard Products NEC	11.37

Table D.2. (continued)

Company	Industry	C.V.* Plant Assets
Bemis Co.	Convert Paper--Paperboard Products NEC	4.83
Simplicity Pattern Co.	Printing, Publishing and Allied	7.29
Times Mirror Co.	Newspapers: Publishing--Print	3.47
Unilever N.V.	Soap and Other Detergents	4.27
Cabot Corp.+	Miscellaneous Chemical Products	8.77
Johns-Manville Corp.	Paving and Roofing Materials	3.17
H.H. Robertson Co.	Paving and Roofing Materials	1.67
Dayco Corp.	Rubber and Miscellaneous Plastics Products	11.37
General Tire and Rubber Co.+	Rubber and Miscellaneous Plastics Products	4.75
Mohawk Rubber Co.	Rubber and Miscellaneous Plastics Products	3.30
Medusa Corp.	Cement Hydraulic	3.50
Standex International Corp.	Miscellaneous Metal Work	6.88
Illinois Tool Works	Bolts--Nuts--Screws--Rivets--Washers	5.06
Combustion Engineering Inc.	Engines and Turbines	7.64
Twin Disc Inc.	General Industrial Machinery and Equipment	5.38

Table D.2. (continued)

Company	Industry	C.V.* Plant Assets
Zurn Industries Inc.	Pollution Control Machinery	6.65
Westinghouse Electric Corp.+	Electrical Machinery Equipment and Supplies	5.73
Sunbeam Corp.	Household Appliances	6.75
Motorola Inc.	Radio--TV Transmitting Equipment--AP	8.66
AMP Inc.	Electronic Components and Accessories	8.56
Echlin Manufacturing Co.	Electrical Machinery and Equipment NEC	11.19
Allen Group	Motor Vehicle Parts--Accessories	5.30
Maremont Corp.	Motor Vehicle Parts--Accessories	5.32
Fleetwood Enterprises	Travel Trailers and Campers	14.30
Sybron Corp.	Surgical and Medical Instruments and Appliances	1.75
Philip A. Hunt Chemical	Photographic Equipment and Supplies	9.70
Norlin Corp.	Musical Instruments	9.83
Brunswick Corp.+	Toys and Amusements, Sporting Goods	8.02
Coleman Co. Inc.	Toys and Amusements, Sporting Goods	5.66
Amfac Inc.	Retail--Department Stores	5.49

Table D.2. (continued)

Company	Industry	C.V.* Plant Assets
King's Department Stores	Retail--Department Stores	10.83
K Mart Corp.	Retail--Variety Stores	12.78
F.W. Woolworth Co.	Retail--Variety Stores	1.50
Jewel Companies Inc.	Retail--Grocery Stores	2.31
Howard Johnson Co.	Retail--Eating Places	3.47
Trans Union Corp.	Conglomerates	7.19

* Coefficient of variation for plant assets.

+ Also a member of the Method A sample.

Table D.3. The control group.

Company	Industry	C.V.* Plant Assets
Oscar Mayer and Co.	Food--Meat Packing	4.72
Campbell Soup Co.	Canned--Preserved Fruits--Vegetables	1.19
Great Northern Nekoosa Corp.	Paper and Allied Products	4.31
Union Camp Corp.	Paper and Allied Products	8.18
Diamond International Corp.	Paperboard Containers--Boxes	2.17
Standard Register Co.	Manifold Business Forms	3.41
Wallace Business Forms	Manifold Business Forms	5.99
Reichhold Chemicals Inc.	Plastic Material and Synthetic Resin	13.96
Pfizer Inc.	Drugs	6.03
Schering-Plough	Drugs	8.62
Upjohn Co.	Drugs	10.38
Oakite Products	Soap and Other Detergents	4.03
Bristol-Myers Co.	Perfumes, Cosmetics, Toilet Preparations	4.72
Chesebrough-Pond's Inc.	Perfumes, Cosmetics, Toilet Preparations	7.75

Table D.3. (continued)

Company	Industry	C.V.* Plant Assets
Dexter Corp.	Miscellaneous Chemical Products	15.04
Lawter Chemicals Inc.	Miscellaneous Chemical Products	6.49
Lubrizol Corp.	Miscellaneous Chemical Products	6.32
Interco Inc.	Footwear Except Rubber	10.43
Crown Cork and Seal Co. Inc.	Glass Containers	3.65
Louisville Cement	Cement Hydraulic	6.92
Kennametal Inc.	Miscellaneous Primary Metal Products	8.62
Marley Co.	Fabricated Metal Products NEC	15.14
Deere and Co.	Farm and Garden Machinery and Equipment	13.55
American Hoist and Derrick Co.	Construction Machinery and Equipment	6.06
Dover Corp.	Special Industry Machinery	9.29
Barnes Group Inc.	Machinery--Industrial	4.19
Gorman-Rupp Co.	Machinery--Industrial	5.36
Hobart Corp.	Machinery--Industrial	5.70
Burroughs Corp.	Office Computing and Accounting Machines	4.09

Table D.3. (continued)

Company	Industry	C.V.* Plant Assets
International Business Machines Corp.	Office Computing and Accounting Machines	2.10
Sperry Rand Corp.	Electronic Computing Equipment	3.92
Emerson Electric Co.	Electrical Machinery Equipment and Supplies	9.13
Crouse-Hinds Co.	Electrical Transmission and Distribution Equipment	6.82
Reliance Electric Co.	Electrical Transmission and Distribution Equipment	11.16
Burndy Corp.	Electronic Components NEC	3.36
Dana Corp.	Motor Vehicle Parts--Accessories	2.54
Eagle-Picher Industries	Motor Vehicle Parts--Accessories	10.97
TRW Inc.	Motor Vehicle Parts--Accessories	3.18
Timken Co.	Motor Vehicle Parts--Accessories	6.90
Beech Aircraft Corp.	Aircraft	4.23
Perkin-Elmer Corp.	Engineering Laboratory and Research Equipment	7.71
American Hospital Supply	Surgical and Medical Instruments and Accessories	11.22
C.R. Bard Inc.	Surgical and Medical Instruments and Accessories	4.08
Johnson and Johnson	Surgical and Medical Instruments and Accessories	6.09

Table D.3. (continued)

Company	Industry	C.V.* Plant Assets
Eastman Kodak Co.	Photographic Equipment and Supplies	5.06
Associated Dry Goods Corp.	Retail--Department Stores	6.22
G.E. Murphy Co.	Retail--Variety Stores	3.22
Fisher Foods Inc.	Retail--Grocery Stores	17.18
Lucky Stores Inc.	Retail--Grocery Stores	4.27
Colt Industries Inc.	Conglomerates	6.21

* Coefficient of variation for plant assets.

VITA

James Rosser Collins, son of Vera M. and Rosser L. Collins, was born on February 9, 1946, in Raleigh, North Carolina. He attended public schools in that city and was graduated from Needham B. Broughton Senior High School in June, 1964. In September, 1964, he enrolled at North Carolina State University in Raleigh and completed the requirements for a Bachelor of Science degree in Engineering in May, 1968.

After a two-year tour of duty with the United States Army, he entered the Graduate School of East Carolina University in Greenville, North Carolina, in December, 1970. He received the Master of Business Administration degree with a major in Accounting in March, 1973. He accepted a position as a staff accountant with Deloitte, Haskins, and Sells in Raleigh, North Carolina, starting in May, 1973. In November, 1973, he passed the Uniform Certified Public Accountant Examination.

He enrolled in the Graduate School at The University of Tennessee, Knoxville, Tennessee, in September, 1974, and received the Doctor of Business Administration degree with a major in Accounting in August, 1979. While enrolled in this program, he was awarded a Walter Melville Bonham Fellowship for 1979. He is a member of the American Accounting Association, the American Institute of Certified Public Accountants, Beta Alpha Psi, Beta Gamma Sigma, the National Association of Accountants, and the North Carolina Association of Certified Public Accountants.

He is married to the former Bobbie Lee Lamons of Knoxville, Tennessee.