This is to certify that the

dissertation entitled

EFFECTS OF ACCOUNTING TECHNIQUES ON THE

STUDY OF MARKET POWER

presented by

Kiran Verma

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Accounting

Major professor

Date 8/17/87

EFFECTS OF ACCOUNTING TECHNIQUES ON THE STUDY OF MARKET POWER

by

Kiran Verma

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSPHY

Department of Accounting

1987

ABSTRACT

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The purpose of this study is to examine the effects of alternative accounting techniques on inferences drawn from the relationship between firm profitability and its market power. Accounting data have been widely used as sample evidence in such analyses. As accounting rules allow firms considerable leeway in their chioce of accounting techniques, it has been alleged that inferences drawn from such analyses are potentially misleading. This is particularly true for time series analyses at the firm level where interfirm differences due to accounting techniques are not aggregated out.

This study is conducted in two parts. The first part deals with the development of a model linking a firm's accounting profit to its market share, capital stock, and

raw materials used in production. The second part examines the robustness of this model to estimation using accounting data that are generated by alternative accounting techniques (e.g. LIFO vs. FIFO, Straight line vs. Double Declining Balance, and Historical cost vs. Replacement cost).

Unlike model developed in previous research, the model in this study specifically incorporates the presence of inventories. This is done in order to describe more closely the economic phenomenon of measuring the accounting cost of goods sold and hence the accounting profit.

Robustness of the model developed above is tested with respect to two parameters, (1) its explanatory power, and (2) inferences drawn from it about the firm's market power. The results show that both of these parameters are sensitive to the choice of certain accounting techniques. This effect is most pronounced for the change in inventory techniques and almost nonexistant for the change in depreciation techniques. The results are mixed for the change from Historical cost to Replacement cost.

To Sumi, Charu, and Priya

ACKNOWLEDGEMENTS

Special thanks to Ed Outslay, Ron Marshall, and Stephen Martin for their numerous suggestions and support. Also thanks to Ernst and Whinney for financial support.

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I INTRODUCTION

Establishing methods for assessing the desirability and effects of alternative accounting techniques has long been a goal of accounting researchers and accounting policy makers. Despite an abundance of empirical and theoretical research in the area, several of the issues are still unresolved. The purpose of this study is to examine the effects of accounting techniques in the context of a specific economic analysis and with respect to a specific class of users. The economic analysis involves the study of market performance in the area of industrial organization by researchers and antitrust policy makers.

Two important reasons for analyzing the impact of different accounting methods on the relationship between profitability and market structure are the following. First, as mentioned before, the issue of accounting techniques is of considerable importance for accounting policy makers. Second, the study of determinants of market structure has relevance not only for economists, but also for regulators, legislators, and lawyers dealing with antitrust litigation (Adams [1979]). In this context, accounting rates of return are frequently used as a measure of profitability and treated as an index of monopoly power.[1]

Accounting numbers are among the most frequently used data in empirical work on industrial organization. The systematic properties of these numbers are used as a basis for making inferences about market structure and market performance factors (such as the presence of monopoly power and above normal profits). Thus, potential effects of accounting techniques on such inferences are an important factor to be considered by researchers in this area. According to Gonedes and Dopuch [1979], this role of accounting numbers and the large cost of making avoidable, unwarranted inferences are sufficient grounds for being interested in the effects of accounting techniques.

II BACKGROUND

2.1 Effects of Alternative Accounting Techniques

Research examining the effects of alternative accounting techniques has taken several approaches. Prior to the mid 1960's most attempts to deal with the question used 'a priori' models which purported to establish criteria for identifying the 'best' or 'optimal' accounting procedures (e.g. Paton and Littleton [1940], Chambers [1966], and Edwards and Bell [1965]). Subsequently the 'a priori' approach came under heavy criticism because (1) it lacked theoretical background, and (2) using this approach one could declare just about any set of accounting procedures 'superior'. These failings have led to an increased emphasis on the use of empirical analyses to assess the effects and desirability of alternative accounting techniques.

Other approaches taken by researchers in this area include the 'materiality' studies and the studies based on the connection between market equilibrium and accounting techniques. The 'materiality' research examined whether the process generating an accounting number according to one accounting technique is significantly different (say by a percent rule) from the process generating the same number according to a different technique. This test of 'significance' usually involved point by point comparison of observed values conditional on alternative accounting techniques (see Rosenfeld [1969], and Peterson [1973]). These studies, however, ignored the time series issues involved, and as such provided no basis for inferring that the two stochastic processes corresponding to alternative accounting techniques were different just because contemporaneous drawings from each process were different.

In other studies (e.g. Dopuch and Watts [1972], Dopuch and Drake [1966], and Dopuch and Pincus [1984]) it has been argued that significance (materiality) could be determined by assessing the effect of a change in accounting technique on parameters of the time series process generating the accounting number of interest. These studies do not answer the question of whether predictive ability, or variability, is a sufficient basis for assessing the effects or the desirability of accounting techniques. Similar deficiencies characterize the simulation studies (examples of the simulation studies are Simmons and Gray [1969], and Greenball [1968 and 1969]).

On the other hand, market equilibrium studies are based on explicit theoretical models of resource allocation under uncertainty (see Ball and Foster [1982] for a review of such studies). These studies suffer from two common problems. (1) When do capital market agents learn about a firm's choice of accounting methods (date of event), and (2) how does one control for confounding information which is generally released along with the "main event"? These models provide some underpinnings for empirical work on techniques (see Gonedes and Dopuch [1974] for a discussion), solid underpinnings are also available in other areas, such as the area of industrial organization.

The approach used by a number of researchers working in the area of industrial organization can be categorized as the "True" or "Ideal" number approach (see e.g. Ayanian [1975], Bloch [1976], Clarkson [1977], and Weiss [1969]). These studies are based on the premise that accounting techniques lead to 'biased' income numbers because they are not computed according to procedures asserted to provide values of 'Ideal' or 'True' income.

In some of these studies it was found that inferences based on restated values differed from those based on reported values. These studies, nonethless, did not specifically assess the potential effects of accounting techniques on inferences that were based on values of accounting numbers. More importantly, in several of these studies it was asserted that the restatement techniques used were somehow superior to conventional techniques in that they led to 'more informative' numbers. The restatement techniques used in these studies, however, are just as arbitrary as conventional techniques since the models they are based on are not descriptive of a world with uncertainty, imperfect markets, and multiperiod horizons.

2.2 Purpose of the dissertation

There are two basic problems of using accounting based variables in economic analyses which can be conceptualized as follows (see Nair [1977]),

$$A \leftarrow B$$

$$B_1$$

$$B_2$$

here A is the unobservable economic variable such as economic profit, B is the accounting surrogate such as accounting income, and B_1 and B_2 are accounting income numbers computed under alternative accounting techniques such as LIFO vs. FIFO. The first problem deals with whether the accounting variable is a good surrogate for the economic variable, i.e., whether the same modeled relationship holds for the economic and the accounting variable. The second problem is that even after picking the surrogate accounting variable, the problems continue because of the several different ways of producing the accounting number. Most of the previous studies have only examined the second problem.[2]

In the proposed study, both of these problems are dealt with. The first problem is overcome by developing a structural model which specifically links accounting numbers with parameters of market structure such as the elasticity of demand, product differentiation, and market share. This model also attempts to deal with the issue of multiperiod horizons, which according to Gonedes and Dopuch [1979] (footnote 10) is one of the basic concerns.

Based on this model, the second problem is examined by forming and testing hypotheses about the potential effects of alternative inventory (LIFO vs. FIFO), depreciation (st. line (SL) vs. double declining balance (DDB)), and asset valuation (historical cost (HC) vs. replacement cost (RC)) techniques on inferences about market power. Instead of presuming that the same relationship exists between independent and dependent variables when estimated using accounting instead of economic values, the present study will model the relationship between accounting values and the parameters of interest directly, and based on it will hypothesize the effects of alternative accounting techniques.

2.3 Profitability and Market Structure

Collusion in oligopolistic industries that is potentially damaging to consumers has not only been the cause of legal restrictions and increased regulation, but has also given rise to an enormous amount of research attempting to relate market concentration to the exercise of monopoly power.[3] Most such studies have measured market structure by an index of concentration[4] (e.g. the four firm concentration ratio as a surrogate for market power), and performance by accounting profit (such as gross profit/sales as a surrogate for the Lerner Index).[5] In general, these studies found a positive relationship between concentration and accounting profitability measures.

A major criticism of these studies has been the potential introduction of biases by the use of Accounting Rates of Return (ARR). Benston [1985] discussed several studies that have used the ARR as a surrogate for the Internal Rate of Return (IRR). He pointed out that if the differences between accounting measures and economic measures were randomly distributed with respect to variables of interest, the result would not seriously alter inferences about the parameters of interest. Opinion is divided, however, as to whether this error is actually randomly distributed. Hagerman and Senbet [1976], and Long and Ravenscraft [1984] have claimed that there is no correlation between choices of accounting techniques and concentration, while others (e.g., Watts and Zimmerman [1978], Dhaliwal, Salamon and Smith [1981], and Hagerman and Zmijewski [1979]) have found systematic differences in the accounting methods adopted by firms of different sizes. This latter result implies that the relationship between concentration and profits may be present because accounting mismeasurement is positively correlated with size (which in this case is presumed to be a measure of concentration).

Several other researchers (see Harcourt [1965], Livingstone and Salamon [1970], and Fisher and McGowan [1983]) developed theoretical models of firms' investment patterns and showed that the ARR is a poor surrogate for the firms' IRR, and therefore according to Fisher and McGowan,

> Accounting Rates of Return even if properly measured provide almost no information about economic rates of return. (See Fisher and McGowan [1983], pp. 82)

Salamon [1985] came to a similar conclusion using conditional IRR estimates and said that it was the nature and the strength of the measurement error in the ARR, rather than the correctness of the underlying economic argument, that accounted for the observed positive association between firm size and firm profitability.

In his discussion of the Fisher and McGowan article, Martin [1984] pointed out that in economics literature there are different definitions of economic profit, only one of which is the discount rate that equates the present value of its expected net revenue stream to its initial outlay (the definition of the IRR used in the theoretical studies mentioned before). Another definition that arises normally in the formal models of profit maximizing firms is the Lerner Index of monopoly power (or the price-marginal cost margin that was defined in footnote 5). Martin further goes on to state that,

> It is doubtful whether any measure of profitability can be unambiguously identified as "correct" to the exclusion of all others, for the purposes of economic analysis. Fisher and McGowan's discussion of what they call the "economic rate of return" does not establish that measures of profitability based on the Lerner index are inappropriate for economic analyses. (Martin [1985], pp. 502)

The model developed in the proposed study is based on the Lerner Index of monopoly power. Unlike earlier models, however, where accounting values are treated as surrogates of economic values, this model relates market power directly to accounting values of gross profit, plant and equipment, and the value of raw materials used in the production of the goods sold.

III THE MODEL

The model relating accounting profit rate to market power is a variation on the model developed by Martin [1985], and Clarke, Davies and Waterson [1976]. Model development is divided into three sections. The first section gives the background to a simple model of a profit maximizing firm in an oligopolistic environment. In the second section, the model is developed further to encompass factors of production, and relate the firm's profit rate (specifically its accounting profit rate) to its market power. In the third section, effects of accounting techniques on the key parameters of the model are analyzed.

3.1 A simple model of a profit maximizing firm

Market power can be thought of as the ability of a firm to influence the price of its own product. This notion of market power can be captured in the context of a profit maximizing firm in a monopolistic environment (i.e.,the case of a single seller economy) as,

$$\pi = P(Q)Q - C(Q) \qquad (1)$$

where π is the profit, P is the price that the firm charges for its output, Q is the quantity sold, and C(Q) is a cost function. Note that here the price P is a function of the quantity sold, Q.

In this simple case, it is assumed that the quantity of goods sold is equal to the quantity of goods manufactured. Assuming the usual conditions for a production function that are neccessary for profit maximization, the first order conditions give,[6]

$$\frac{P - MC}{P} = \frac{1}{\epsilon_{QP}} \tag{2}$$

where MC is the Marginal cost, and ϵ_{QP} is the price elasticity of demand for the firm. By adding and subtracting average cost (AC) from both sides of the equation,

$$\frac{P - AC}{P} = \frac{1}{\epsilon_{QP}} + \left(\frac{1}{FC} - 1\right)\frac{AC}{P} \tag{3}$$

where FC = AC/MC is the function coefficient is a measure of the economies of scale of a firm. The function coefficient will be large when the cost of production of a marginal unit is small as compared to the average cost of production. A function coefficient of one implies constant returns to scale.

Extending this case of a single seller to an oligopolistic environment means that now the price will depend on not only the output of the firm but also on the output of all rival firms. Defining α as a measure of collusion among firms as,

$$\alpha = \frac{Q_{-i}}{Q_i}\frac{dQ_i}{dQ_{-i}} \tag{4}$$

where Q_i = firm's own output, and Q_{-i} = the output of the rival firms. Making the assumption that α is a constant, and maximizing the profits of the firm in an oligopolistic environment, eqn. (3) becomes,[7]

$$\frac{P - AC}{P} = \frac{\alpha + Si(1 - \alpha)}{\epsilon i} + [\frac{1}{FC} - 1] \frac{AC}{P} \qquad (5)$$

here $Si = Qi/Q{-}i{+}Qi$ is the firm's market share, and ϵi is the price elasticity of demand for firm i. For the simple model given by eqn. (5), the test for market power involves the intercept term $[\alpha{+}Si(1{-}\alpha)]/\ \epsilon i$. When the firm is in pure competition, the price elasticity of demand $\epsilon i \rightarrow \infty$, and so the intercept should $\rightarrow 0$. Therefore, the presence of market power would imply an intercept that is not equal to 'zero'.

In order to estimate eqn. (5) for a profit maximizing firm, an evaluation of the optimal factors of production or AC is needed. This is done in the next section by maximizing the one period economic profit (change in value) of a firm.

3.2 Factors of Production and Accounting Values

To evaluate the cost of the factors of production, AC in eqn. (5), the present discounted value of firm is maximized over one period. It is assumed that the firm invests in capital at the beginning of the period, and produces and sells at the end of the period. Then the present discounted value (PDV) of a firm can be written as the discounted value of the firm at the end of the period less the value at the beginning of the period, i.e.

$$PDV = -P_0^K[K_E + I] - b_0^R(Sr_t + \bar{R}_t) + \left(\frac{1}{1+r^*}\right)\{P(S_{t+1},\bar{Q})\bar{Q}$$

$$- WL - C^F(S_{t+1}) - C^R(Sr_t + \bar{R}_t) + P_1^K(1 - \tau)(K_E + I)$$

$$+ b_1^R(1 - \Delta)(Sr_t + \bar{R}_t) + P(S_{t+1},\bar{Q})S_{t+1}\} \qquad (6)$$

here,

P_0^K = Per unit price of capital stock other than raw materials (plant and equipment) at the beginning of the period.

K_E = Endowment of Plant and Equipment inherited from the last period.

I = Investment in Plant and Equipment during the time period.

b_0^R = Price per unit of capital consisting of raw materials.

Sr_t = Stocks of raw materials at the beginning of the period(beginning inventory of raw materials).

$\bar{R}_t$ = Raw materials purchases.

S_t = Stocks of finished goods inventory at the beginning of the period.

r^* = Discount rate for the period.

P = Price of goods sold.

$\bar{Q}$ = Quantity of goods sold.

W = Per unit labor cost.

L = Total units of Labor used during the period.

C^F = Per unit holding cost for finished goods inventory.

C^R = Per unit holding cost for raw materials inventory.

P_1^K = Per unit price of Plant and Equipment at the end of the period.

τ = Depreciation rate Plant and Equipment.

b_1^R = Per unit price of raw materials at the end of the period.

Δ = Rate of usage of raw materials.
Note: $\Delta = 1$ implies no ending raw materials inventory.

It is important to note the following points about eqnation (6) for the PDV.

1. This equation differs from the PDV formulation in earlier models, in that, both raw materials and finished goods inventories have been incorporated in the model. It is no longer assumed that all of the goods manufactured are sold. This inclusion of inventories in the model has been done in order to analyze specifically the effects of alternative accounting inventory techniques(LIFO vs. FIFO) and to separate their effects from the effects of alternative long lived asset valuation techniques (e.g. HC vs. RC, and SL vs. DDB)
2. In this model price P is a function of the quantity of finished goods sold Q, and the ending finished goods inventory S_{t+1}. This formulation is based on the argument that the presence of finished goods inventory helps meet consumer demands more efficiently, and therefore, the firm should be able to charge a higher price for its product which includes the provision of this service.
3. Last period's finished goods inventory, S_t, is not

explicitly included in the model because its value to the firm or its opportunity cost is not determinable. This is because it is assumed that the firm can only produce the good and is not able to buy it in the outside market.[8]

4. The per unit inventory holding costs, C^F, and C^R for finished goods and raw materials respectively, are assumed to be constants. Also it is assumed that all costs to hold last period's finished goods inventory were paid out in the previous period and hence do not feature in this period's decision problem.

Therefore, the decision problem is to maximize PDV or equivalently (1+r*)PDV.
Equation (6) can be simplified by substituting μ_Υ and μ_Δ in the equation where,

$$\mu_\Upsilon = r^* + \Upsilon + (1 - \Upsilon)\left(\frac{P_1^K - P_0^K}{P_0^K}\right)$$

and $$\mu_\Delta = r^* + \Delta + (1 - \Delta)\left(\frac{b_1^R - b_0^R}{b_0^R}\right)$$

Substituting μ_γ and μ_Δ in eqn. (6), the decision problem becomes,

$$\max_{[L, I, R_t, S_{t+1}, Q]} \quad P(S_{t+1}, \bar{Q})\bar{Q} - WL - C^F(S_{t+1}) - C^R(Sr_t + \bar{R}_t) - \mu_\gamma P_\theta^K(K_E + I) - \mu_\Delta b_\theta^R(Sr_t + R_t) + (1/1+r^*)\, P(s_{t+1}, Q)S_{t+1}$$

$$\text{s.t.} \quad S_t + Q(K_E + I,\ L,\ Sr_t + \bar{R}_t) = \bar{Q} + S_{t+1}$$

here, $Q(K_E + I,\ L,\ Sr_t + R_t)$ = Quantity of finished goods manufactured.[9] Note that in this simplified form, μ_γ can be thought of as the implicit rental for services of a unit of capital consisting of Plant and Equipment that costs a dollar, and μ_Δ is likewise the implicit rental for capital that consists of raw materials.

A detailed mathematical analysis of the following section is given in the appendix. The first order conditions (eqns. (A.1), (A.2), (A.3), (A.4), and (A.5) in the appendix) are,

$$\mu = MC \qquad (8)$$

$$\delta P/\delta S_{t+1}(\bar{Q} + (1/1+r^*)s_{t+1}) = C^F + \mu = MC \qquad (9)$$

$$\mu_\gamma P_\theta^K/MP_K = \mu = MC \qquad (10)$$

$$(C^R + \mu_\Delta b_\theta^R)/MP_R = \mu = MC \qquad (11)$$

$$W/MP_L \quad = \quad \mu \quad = MC \tag{12}$$

here MP_K, MP_R, and MP_L are the marginal products with respect to capital (K and R) and labor respectively.

Using eqns. (10), (11), and (12) to evaluate the factors of production we get eqn. (A.9) from the appendix,

$$\frac{PQ - WL - b\bar{R}_t \; - C^R R}{PQ} = (1 - FC + \frac{\alpha FC}{\epsilon_i}) + (\frac{1 - \alpha}{\epsilon_i})FC.Si + \frac{\mu_K \gamma P_\theta K}{PQ} + \frac{bR_t}{PQ}(h\,\mu_\Delta - 1) \tag{13}$$

here h is a parameter that characterizes an inventory policy under which the ending inventory of raw materials available for use are kept at a constant proportion to the optimal quantity of raw materials to be used in production (see the appendix for a complete discussion).

Equation (13)in terms of accounting Sales Revenue, and accounting Cost of Goods Sold is (from eqn. (A.12) from the appendix),

$$\frac{\text{Accounting Gross Profit}}{\text{Sales}} = (1 - FC + \frac{\alpha FC}{\epsilon_i}) + (\frac{1-\alpha}{\epsilon_i})FC.Si$$

$$+ \mu_T[\frac{1}{\frac{\Delta I}{CGS}+1}]\frac{\text{Plant and Equipment}}{\text{Sales}}$$

$$+ (h\mu_\Delta - 1)[\frac{1}{\frac{\Delta I}{CGS}+1}]\ [\frac{\text{Change in the values of raw material inventories} + \text{raw material purchases}}{\text{Sales}}] \quad (14)$$

So the equation to be estimated is of the form,

$$\frac{\text{Sales - CGS}}{\text{Sales}} = a_0 + a_1 S_i + a_2[\frac{1}{\frac{\Delta I}{CGS}+1}]\frac{\text{Plant and Equipment}}{\text{Sales}}$$

$$+ a_3[\frac{1}{\frac{\Delta I}{CGS}+1}]\ [\frac{\text{Change in the values of raw material inventories} + \text{raw material purchases}}{\text{Sales}}] + e_i \quad (15)$$

here ΔI is the change in finished goods inventory and e_i is a stochastic error term.

For the evaluation of market power, the coefficients of interest are,

$$a_0 = 1 - FC + (\alpha FC/\epsilon_i), \quad (16)$$

and, $$a_1 = [(1 - \alpha)/\epsilon_i)]FC \quad (17)$$

From eqns. (16) and (17), $[\alpha+S_i(1-\alpha)]/\epsilon_i$ can be shown to be,

$$\frac{[\alpha+S_i(1-\alpha)]}{\epsilon_i} = 1 - \frac{1 - a_0 + a_1 S_i}{FC} \quad (18)$$

Now for the pure competition case, as $\epsilon_i \to \infty$, $1 - [1 - (a_0 + a_1 S_i)]/FC$ should $\to 0$. Therefore, the test criterion for the presence of market power depends on, $1 - [1 - (a_0 + a_1 S_i)]/FC$ being $\neq 0$. For the case when $\alpha > 0$, the test criterion for the presence of market power is of the form,[10]

$$1 - FC < a_0 + a_1 S_i \qquad (19)$$

Hence, the critical coefficients for the test of market power are a_0, and a_1.

3.3 Effects of Accounting Techniques on the coefficients of interest

In the model given by eqn. (15) it is assumed that sales S, and market share S_i, can be measured without error [12], while the CGS, Plant and Equipment, and inventories are susceptible to errors introduced by accounting techniques. The possible estimations of the model are given in Table 1.

Table 1. Combinations of Accounting Techniques.

	RC(LIFO)[13]	HC(LIFO)	HC(FIFO)
SL	1	2	4
DDB	-	3	5

By comparison of the parameter estimates in each of the above cases, it is possible to test the effect of the alternative combinations of techniques on the test criterion given by eqn. (19), the magnitudes of the individual coefficients (a_0, a_1, a_2, a_3), and on the fitted R^2 of the estimated equations.

From econometric theory it can be hypothesized that even though the coefficients of interest, a_0 and a_1, do not involve variables with systematic errors, the errors in other variables, however, can impact the coefficients of interest. The magnitude and direction of this bias will depend on the relative magnitudes of the covariance matrices of errors with respect to the covariance matrices of the true variables.[14] In eqn. (15), it can be assumed that the error in the term $\{1/[(\Delta I/CGS) + 1]\}$ is very small.[15] Therefore, the errors in the last two variables on the right hand side of eqn. (15) are primarily due to errors in plant and equipment, and raw material inventory measurements respectively. The effects of these errors can be highlighted by comparing different estimations as shown in the following table.

Table 2. Pairwise comparison of alternative accounting accounting techniques.

	Comparison of	Highlights the effect of	|	conditional on
A	(1) with (2)	HC vs. RC	|	SL
B	(2) with (4)	LIFO vs. FIFO	|	HC and SL
C	(3) with (5)	LIFO vs. FIFO	|	HC and DDB
D	(2) with (3)	SL vs. DDB	|	HC and LIFO
E	(4) with (5)	SL vs. DDB	|	HC and FIFO

IV HYPOTHESES

The following hypotheses are formulated in order to test the robustness of the estimated model with respect to alternative accounting techniques. The hypotheses are divided into three parts.

As a preliminary test, the first set of hypotheses can be formulated in order to test the robutness of the induvidual estimated coefficients. The hypotheses can be stated as,

(1a) $H_0 1a: \quad a_c = 0$

$H_A 1a: \quad a_c \neq 0$

here superscript c = 0,.....,3 corresponds to the coefficients a_0, ...a_3.

(1b) $H_0 1b: \quad a_c^{j|m} = a_c^{'j|m}$ for all j, j,'m, and c $j \neq j'$

$H_A 1b: \quad a_c^{j|m} \neq a_c^{j|m}$

here (j,j') denote a pair of alternative accounting techniques(e.g. LIFO, FIFO), and m denotes a particular combination of techniques that j and j'are conditional on.

The null hypothesis 1a states that the individual estimated coefficients are insignificantly different from zero. The rejection of this hypothesis and proper signs on the coefficients would indicate that the model is robust with respect to estimation.

The null hypothesis (1b) states that there is no effect of accounting techniques on the estimated coefficients. This would imply that the model is robust with respect to accounting techniques.

Hypotheses (1a) are tested by examining the 't' statistics of the estimated coefficients (see Christie [1986]). Hypotheses (1b) are tested by using the 't' test for difference in means with unknown variances.

A second set of hypotheses can be formulated based on the fitted R^2 of the estimated equations.

(2) $H_0 1: \quad R^2_j = R^2_{j'}$

$H_A 1: \quad R^2_j \neq R^2_{j'}$

here j, and j' refer to different sets of accounting techniques.

These hypotheses are tested in two ways. First, the form of analysis outlined in section 3.3 can be viewed as a single factor experiment with 8 subjects or firms being measured under combinations of 5 levels of factors (accounting methods, combinations 1,...,5 in Table 1). The proposed technique is the repeated measures technique described by Myers [1972 (pp. 186-187)]. Second, the above hypotheses are tested using nonparametric tests such as the Kendall's coefficient of concordance and the Spearman's correlation coefficient.

The third set of hypotheses are formulated in order to test the senstivity of the test criterion given by eqn. (19). Under the assumption of constant returns to scale,[16] the test criterion(T) for market power is,

$$T = a_0 + a_1 S_i > 0$$

Using this test criterion, the firms can be ranked by market power. The stability of this ranking system with respect to estimation techniques is an important policy issue. The hypotheses based on the test criterion can be stated as,

(3a) $H_0 3a$: $T^j = T^k$ for all j,k, $j \neq k$

$H_A 3a$: $T^j \neq T^k$

where j,k = 1,.....,7 denote the combinations of techniques given in Table 1.

(3b)

$H_0 3b$: $T^{j|m} = T^{j'|m}$ for all j, j', and m, $j \neq j'$

$H_A 3b$: $T^{j|m} \neq T^{j'|m}$

The null hypotheses state that the test for market power is stable with respect to alternative accounting techniques, whereas the alternative hypotheses state that it is not. Hypotheses (3a, and 3b) are tested by examining the shifts in firm rankings due to alternative accounting techniques. This shift in ranks is tested by using a non parametric test such as the Kendall's coefficient of concordance and the Spearman's correlation coefficient.

A rejection of the alternative hypotheses (3a, and 3b) would indicate that the estimation of the model is robust with respect to accounting methods.

V METHODOLOGY

The methodology consists of estimating equation(15) with time series data at the firm level. This method is preferable to using industry level crossectional data for the following two reasons. First, as the risks faced by different firms in an industry are different, it is unlikely that the implicit rate of rental for capital stock (μ) is the same for every firm in the crossectional sample. Therefore, the use of crossectional data is not appropriate for the estimation of this model. The second reason is that the issue of firm specific market power is aquestion with direct policy implications, and therefore its stability with respect to estimation techniques is worth investigating.

In, summary, the research method is to restate reported inventory and capital stock figures for a sample of eight firms. This restatement yields a set of five financial statements for each firm, i.e. 40 in all. The model is first estimated with the reported data and then with the restated data. The results are then compared in order to examine the effects of alternative accounting methods on the relevant estimated coefficients.

5.1 Restatement Procedure

One of the ways of examining the effects of accounting techniques on economic analyses proposed by Gonedes and Dopuch [1979] was to restate reported accounting numbers of the firm and repeat the economic analyses with the restated numbers.

The restatement routines used in this study for inventory and depreciation amounts are the methods proposed by Nair [1977] which basically make use of the Dollar Value LIFO method for inventory and asset layering techniques for depreciation restatements respectively. The restatement to Replacement Cost is done using the method proposed by Falkenstien and Wiel [1977].

5.2 Inventory Restatement

The restatement method used for inventories is the Dollar-Value LIFO method. This method essentially removes from the inventory effects that are solely due to price changes. These methods are illustrated in detail by Nair [1977]. As Nair pointed out, in order to apply these restatement procedures the following simplifying assumptions have to be made. Though these assumptions are fairly restrictive, they can be relaxed if more detailed data were available. The assumptions are,

1. For firms which use combintions of techniques for inventory, it is assumed that the primary method of inventory valuation is used for all inventory. This simplifying assumption is neccessary because not every firm in the sample discloses the precise breakdown of the different inventory methods in use for that firm. If more precise data were available, it would be better to restate only the relevant portion. For example if a firm has 80 percent of its inventory on FIFO and 20 percent on LIFO, restatement to LIFO should be done only on 20 percent of the inventory.

2. In restating LIFO inventory to FIFO it is assumed that all inventory is aquired 5 years before the test period. Similarly for FIFO to LIFO restatement, the ending FIFO inventory 5 years before the test period is assumed to be the beginning LIFO inventory. This is done in order to approximate what the inventory might have been had the firm always been using LIFO.

3. The indices used in this study are the wholesale price indices for various commodity groups that are published on a monthly basis by the Survey of Current Business.

4. For firms that were divesified into several lines of business, the price index used is the one for its primary line of business.

5.3 Restatement for Depreciation

The method outlined by Nair for restating depreciation figures is based on layering assets by using capital expenditure data. These layers are depreciated according to the alternative depreciation techniques and the resultant depreciation amounts aggregated to yield the total depreciation expense for the period. Since in this study it is the restated capital stock series that is used as one of the independent variables, this series is reconstructed using restated depreciation figures beginning from a period three years before the test period. For example, the restated capital stock figure for the year 19x is computed as shown below,

Restated Capital Stock 19x=Capitol Stock 19(x-3)
+Σaquisitions- Σretirements
-Σdepreciation+Σadjustments to
accumulated depreciation
account

Where the aquisitions etc. are summed over the three periods prior to the test period. The following basic assumptions are made in the restatement of depreciation amounts.

1. The first-in-first-out flow is assumed with respect to property acquisitions and retirements.
2. The salvage value is assumed to be zero.

3. Multiindustry firms are restated using the useful life most appropriate for their primary line of business.

5.4 Restatatement to Replacement Cost

The method used for restatement to Replacement cost is proposed by Falkenstien and Wiel [1977]. The price indices used for restatement are published by the Bureau of Labor Statistics's Wholesale Sale Price Index (WPI) for various commodities.

According to Falkenstien and Wiel, FIFO inventory method is a good approximation for replacement cost of inventories, and LIFO cost of goods sold with adjustments for depleted inventory layers is a good approximation of the replacement cost of goods sold.

The procedure is somewhat more complicated for restating the Capital Stock series. The method requires breakdown of the Plant and Equipment account into separate building and equipment accounts and determining the average age of depreciable assets. This is estimated by dividing the accumulated depreciation balance by the repective depreciation charges for that period and then averaging over the test period. This estimated average is a reasonable proxy for the base year from which to measure the replacement cost of fixed assets. Finally appropriate price indices are applied to the net building and equipment accounts to yield the replacement cost of Plant and Equipment.

The basic assumptions and caveats for restatement to replacement cost are,

1. A major approximation in this restatement procedure is the overestimation of the average age of Plant and Equipment which results in overestimates for the increments used to adjust historical cost to replacement cost. As mentioned above, the formula used for estimating the average age is,

$$\text{Average age of depreciable assets} = \frac{\text{Accumulated Depreciation}}{\text{depreciation charge for the year}}$$

However, if the firm is using fully depreciated assets, then the balance sheet shows the historical cost of these assets while deducting accumulated depreciation equal to that amount. Fully depreciated assets add nothing to the balance sheet totals nor to the depreciation charges. Yet, because they remain on the balance sheet, they increase the numerator of the above equation without adding to the denominator, thus overestating the average age of depreciable assets. This overestimation is impossible to remove without detailed knowledge of the fully depreciated assets profile for each firm.

2. Another approximation where replacement cost can be different from that computed by the firm is due to the fact that the firm's internally developed price indices could be different from the price indices that are available from the Bureau of Labor Statistics.

Due to the above reasons the restated values of Plant and Equipment are at best an approximation of the actual replacemnt costs. The above mentioned overstatement could bias the results towards significant effects of the change to replacement cost. This potential bias is discussed more fully in the results and analysis section.

5.5 Data

The time series data for 40 quarters was obtained from the quarterly SEC reports. The sample consists of eight firms in two durable goods industries that have traditionally been interesting to researchers and policy makers as to their levels of concentration. The industries, firms, and their reported methods of accounting techniques are given in Table 3.

Table 3. Firms, Industry SIC codes, and reported accounting methods.

Firm	Industry SIC code	Firms Reported accounting methods
Armco Corp.	3310	LIFO SL HC
U.S. Steel Corp.		LIFO SL HC
Lukens Corp.		LIFO SL HC
LTV Corp.		LIFO SL HC
General Motors Corp.	3711	LIFO DDB HC
Ford Motor Co.		LIFO DDB HC
American Motors Corp.		FIFO DDB HC
Chrysler Corp.		FIFO DDB HC

There was only one firm, U.S. Steel, which had a significant merger (over 40 percent of total assets) with Marathon Oil, a firm that is in a different Indsustry. This neccessitated netting out the effects of this merger for the years 1982-1984. In order to compute market shares, industry data for the Iron and Steel was obtained from the publication 'Iron and Steel Institute' which publishes monthly statistics on shipments and imports of Iron and Steel. The source of industry data for the automobile industry is the 'Ward's Automotive Book'.

5.6 Methods of Analysis

As mentioned before, the main purposes of this study are twofold, (1) to examine the performance of the analytical model developed in section 3.1, and (2) to evaluate the effects of alternative accounting techniques on the performance of this analytical model. For the first purpose, the results of estimation are examined with respect to significance and meaningfulness of the estimated coefficients. For the second purpose, the results due to estimation with alternative accounting techniques are compared with respect to the overall goodness of fit (R^2), the significance of the individual coefficients, and the magnitude of the test criterion ($a_0+a_1S_i$) for market power. For this set of analyses the null hypothesis is that for a particular firm, change in accounting methods will cause no difference in either the goodness of fit of the equation, or in the estimated coefficients that are relevant for the purposes of estimating market power.

In order to test the first set of hypotheses, the parametric 't' test is used to test the significance of individual coefficients.

5.6a Analysis of Variance

The second set of hypotheses formulated in section IV are tested by using a specific version of the Analysis of

Variance technique called the Repeated Measures technique [Meyers 1972 pp. 164-86]. This technique is particularly appropriate for an experimental design where different treatments are applied repeatedly to the same subjects. This technique reduces error variances thereby improving the power of the test, but results in observations that are dependent. The form of analysis outlines in section 3.3 can be viewed as a single factor experiment with 8(or four per industry) subjects (firms) being measured under combinations of five levels of factors(combinations of accounting techniques). The dependent variable in this analysis is the adjusted R^2 of the estimated equations which is an accepted measure of the explanatory power of a model.[19] The proposed model underlying the analysis of the dependent variable R^2 is as follows,

$$Y_{jk} = \mu + \alpha_j + \beta_k + \epsilon_{jk} \quad \text{with } j=1,....5, \text{ and } k=1,...8$$

here $\alpha_j = \mu_j - \mu$ is the main effect of the accounting method factor.

$\beta_k = \mu_k - \mu$ is the main effect of the firm factor.

The null hypotheses of interest can be stated as,

H_{02a}: $\alpha_j = 0$ for all j

H_{02b}: $\beta_k = 0$ for all k

The assumptions underlying the Repeated Measures technique are that,

1. ϵ_{jk} are i.i.d normal.
2. $E(\epsilon_{jk}) = 0$ and $E(\epsilon_{jk})^2) = \sigma^2$ i.e. that the variance of all ϵ's is the same for all subjets.

Though these assumptions are restrictive and hardly met for most populations, Box [1953] points out that in the case where group sizes are equal, the analysis of variance is not very sensitive to nonnormality or inequality of variances. It is important to point out, however, that the condition for randomness of sample selection is not completely met. The sample selection could be considered random to the point that the sample of 8 firms (4 in each industry) were chosen out of the 101 firms for which requests had been sent for data. The two industries chosen for the sample were the ones for which atleast four firms complied with the request for data. Therefore, the selection of a particular firm is not expected to be correlated with the changes in the dependent variable due accounting techniques.

The third set of hypotheses formulated in section IV can be tested by using nonparametric statistics. Under the assumption of constant returns to scale, the test criterion for market power given by equation(19) under the assumption of constant returns to scale is $a_0+a_1S_i$. Therefore, the null can be stated as,

$$H_{03}: \quad T_j = T_k \quad \text{for all } j,k,\ j \neq k$$

where T denotes the test criterion, and j and k denote different combinations of accounting techniques.

The significance of changes in estimated market power due to different accounting techniques is tested by examining the significance of the change in the rankings of firms by market power. The ranking of firms by market power within a particular industry or within the larger set of all firms, is a relevant question when considering policy issues such as merger guidlines or antitrust litigation. A statistically significant shift in the ranks due to estimation with a different combination of accounting techniques would indicate a significant effect of accounting techniques on the estimation of market power. The test used to measure this shift in ranks is the Kendall's coefficient of concordance W (Siegel [1956], pp. 229-38] and the Spearman's rank Correlation Coefficient [Siegel, 1956, pp. 205-13]. These methods are particularly appropriate for small samples. The same methods are used to test the stability of the rankings of firms by the best goodness of fit measure for the estimated model. Also, Kendall's Coefficient of Concordance is used to test the rankings of accounting methods for the best fit (i.e. which method leads to the results with the most expanatory power for a particular firm). These tests are performed in two parts, first with the partial sample at the industry level(i.e. for the four firms in each industry), and second , with the combined sample of both industries. This two part testing of results is done in order to highlight the inter as well the intra differences in results between the two industries incorporated in the sample.

5.6b Kendall's coefficient of concordance W

This statistic is used to measure the strength of the agreement among different rankings of certain entities by differnt ranking mechanisms. In this study the entities are the firm's Test Criterion and Adjusted R^2 and the ranking mechanisms are the accounting techniques. The statistic W can be defined as

$$W = \frac{S}{\frac{1}{12} k^2 (N^3 - N)}$$

Where S = Sum of the squares of deviations from the mean of the sum of ranks assigned to each entity being ranked.

k = Number of sets of ranks = number of ranking mechanisms

N = Number of entities ranked.

This method is illustrated by using the data in Table 59

Firms Acct. Methods	Armco	USS	Lukens	LTV
LIFOSLHC	2	1	3	4
LIFODDBHC	2	1	3	4
FSH	2	4	3	1
FDH	2	4	3	1
R	2	1	4	3
Sum of the ranks	10	11	16	13

Mean of the ranks = 50/4 =12.5

$$S = (10-12.5)^2 + (11 - 12.5)^2 + (16 - 12.5)^2 + (13 - 12.5)^2 = 21$$

Here k = 5, N = 4

$$\text{Therefore } W = \frac{21}{(1/12)\ (5)^2\ (4^3 - 4)} = 0.168$$

The Coefficient of Concordance W, expresses the degree of agreement in rankings among the five methods of estimation. It is important to note that a W equal to 1 indicates perfect agreement among the five methods of estimation and therefore implies that accounting techniques have no effect on the estimated results. The Null hypothesis for this statistic is that of complete independence of rankings, i.e. W = 0, therefore, by the nature of this statistic, in order to show significant effects of accounting techniques we need to accept the Null[20]. In order to be statistically significant, the value of estimated S has to be >= the critical value of S that is availabe from the tables for this technique. Critical value of S from table P (Siegel pp. 286) is 62.6. Since the estimated S = 21 is not >= 62.6, the null hypothesis of independence of rankings is not rejected. Therefore in the case of Iron and Steel Industry, Accounting techniques have significant effects on the ranking of firms by market power.

5.6c Spearman's Rank Correlation Coefficient r_s

Tests using this coefficient are appropriate when the agreement between two sets of rankings is being analyzed (e.g. for the pairwise comparisons like
LIFO vs. FIFO! SLHC. This method of analysis is illustrated by using the data for the Test Criterion in table 60.

		Ranks		
Firms Combination of Techniques	Armco	USX	Lukens	LTV
LIFOSLHC	2	1	3	4
FIFOSLHC	2	4	3	1
Difference di	0	-3	0	3

$\Sigma di^2 = 18$

Then the Spearman's Rank Correlation Coefficient is given by,

$$r_s = 1 - \frac{6\Sigma di^2}{N^3 - N}$$

Since N = 4, therefore $r^s = -0.80$. Here $r_s = 1$ would indicate perfect agreement between different systems of rankings or in other words no effects of accounting techniques. From the table of critical values of r_s (Siegel pp 284) critial value of r_s for N = 4 is 1.00. Therefore -0.8 not being >= 1.00, indicates that the null hypothesis of independence of rankings cannot be rejected. Once again here, accepting the null implies that accounting techniques have significant effects. Therefore in the comparison for the results of LIFO vs. FIFO! SLHC, the results show that the effects of the change from LIFO to FIFO on the rankings by market power are statistically significant.

VI EMPIRICAL RESULTS AND ANALYSIS

The results in this section are divided into five parts. Part (1) consists of general results about the performance of the model. Part (2) gives the results of a parametric 't' test which is done in order to test the effects of accounting techniques on the individual estimated coefficients. Part (3) gives the preliminary analysis of variance results about the effects of accounting techniques on the goodness of fit of the estimated equations. Part (4) gives the results of nonparametric tests such as the Kendall's Coefficient of Concordance and the Spearman's Correlation Coefficient on the rankings of adjusted R^2 of the estimated equations. . Finally part (5) gives the results of the nonparametric tests for the robustness of firm rankings by the market power test criterion. These nonparametric tests are conducted in order to analyze the effects of accounting techniques on the estimated results jointly (using Kendall's coefficient of concordance) as well as on the basis of pairwise comparison (e.g. LIFO vs. FIFO or SL vs.DDB), (using Spearman's correlation coefficient).

6.1 General Results

The results of regressions with reported and restated variables are presented in Tables 4 to 11.

The F statisticis significant for every estimation of the model. A summary of these tables for the adjusted R^2 and the test criterion T are given in Tables 12 and 13. The adjusted R^2 of the fitted equations ranges from 0.31 for Lukens (LIFODDBHC) to 0.98 for General Motors (LIFOSLHC and LIFODDBHC). The Test Criterion ($T = a_0 + a_1 MS$) ranges from 0.25 for LTV (LIFOSLDDB) to 1.298 for Ford Motor Co. (FIFODDBHC).

Table 14 gives the results for hypotheses (1a). The Z-statistic (see Christie [1985]) for individual coefficients is significant for the constant term, a_0, the coefficient for plant and equipment, a_2, and the coefficient for raw materials,a_3. The market power test criterion, T, is also highly significant. Contrary to model predictions, the coefficients for market share and plant and equipment frequently have negative signs. The negative sign for the market share variable , however, is insignificant. The reason for the insignificance of the market share coefficient may be due the fact that since market share for a firm changes very slowly, it is probably highly correlated with the constant term. As for the negative coefficient for the plant and equipment variable, the negative sign persists only for the Iron and Steel industry. This may be due to the fact that for the time period under analysis, this industry has been documented as making large capital expenditures for inefficient and outdated plant and equipment (see Adams [1986] pp. 182), which could be a possible explanation for the observed negative returns to plant and equipment increases.

6.2 Parametiric t test

This test is done in order to test Hypotheses (1b). The results are given in Table 15. As can be seen each of the comparisons is highly significant.

6.3 Analysis of variance

As mentioned in section 5.5, the dependent variable for the analysis of variance is the adjusted R^2 of the estimated equations. The results for the analysis of variance are given in Tables 16, 17, and 18. From the significant F statistics it can be seen that there is an insignificant effect of accounting techniques for either the subsamples of the two industries or for the combined sample. It can be noted that even though statistically insignificant, the effect of accounting techniques is greater for the Iron and Steel industry than for the Automobile industry. On the other hand the firm effect is highly significant in all three cases thereby indicating that the expalanatory power of the model varies accross firms or that there are additional firm specific characteristics that are not captured by this model. This last result is in line with what is to be expected for a simple model such as the one developed in this study.

6.4 Adjusted R^2

The adjusted R^2 of the fitted equation is a measure of the explanatory power of the model. This variable has been studied by researchers in order to rank models (Jorgenson [ ]) and its robustness with respect to accounting techniques has implications for the kinds of inferences drawn from such analyses.

6.4a Kendall's coefficient of concordance

The Kendall's coefficients of concordance for the rankings by the adjusted R^2 are given in Tables 18, 28, and 38. the results indicate that the rankings of firms by the explanatory power of the model are not affected by estimation with alternative accounting techniques. This result is true for the combined sample (Table 18) as well as for the industry subsamples for the Iron and Steel (Table 28) and Automobile (Table 38) industries.

6.4b Spearman's rank correlation coefficient

The consolidated results for the Spearman's correlation coefficient are given in Tables 27, 37, and 47. For this pairwise analysis the result of no effects due to accounting techniques only holds consistently for the SL vs. DDB. All other comparisons show significant effects.

6.5 Market power test criterion

The market power test criterion, whicn as mentioned earlier is a measure of market power of the firm. A statistically significant shift in the rankings of firms by their market power will indicate a significant effect of accounting techniques. This in turn would indicate the possible introduction of a bias in the estimated coefficients due to alternative accounting techniques. The test statistics used to examine the significance of shifts in these ranks are the Kendall's coefficient of concodance, and the Spearman's correlation coefficient.

6.5a Kendall's coefficient of Concordance

The Kendall's coefficient of concordance for rankings by market power are given in tables 49, 59, and 71. the reasults in Tables 49, and 71 indicate that the ranking of firms by market power is not affected by alternative accounting techniques for the combined sample as well as for the subsample for the automobile industry. However for the subsample of the iron and steel industry, there is a significant effect. This result would seem to indicate that the estimation procedure is more robust towards accounting techniques for the automobile industry than for the iron and steel industry.

6.5b Spearman's rank correlation coefficient

The results of the Spearman's Correlation Coefficient test are given in tables 58 - 78 for the test criterion. It can be seen that in the case of ranks based on the Test Criterion, the change from SL to DDB has and insignificant effect, and the change form RC to HCFIFO has a significant effect across all samples. All other changes are statistically significant at the individual industry level but are insignificant at the combined level. It is interesting to note that by rank ordering the r_s values, the effect is the most pronounced for RC vs. HCLIFO (smallest r_s), and the least for LIFO vs. FIFOSL.

Table 4. Results of the time series OLS regression with 36 observations for Armco Inc.

	Constant a_0	Market share a_1	P&E a_2	Raw Material a_3	Adj. R^2	F Stat.	Test Criterion T $a_0+a_1MS^1$	Durbin Watson
LIFOSLHC	0.634*	-0.555	-0.067*	-0.516*	0.69	21.2	0.592*	2.22
	(6.98)	(-1.15)	(-3.23)	(-4.21)			(7.08)	
LIFODDBHC	0.643*	0.630	-0.062*	-0.535*	0.67	19.7	0.596	2.13
	(6.96)	(-1.37)	(-2.94)	(-4.19)			(6.86)	
FIFOSLHC	0.999*	-0.855*	-0.058*	-1.029*	0.80	38.1	0.936*	2.55
	(13.8)	(-2.03)	(-3.22)	(-8.31)			(12.1)	
FIFODDBHC	1.001*	-0.888*	-0.059*	-1.031*	0.79	36.7*	0.936*	1.83
	(7.34)	(-2.65)	(-6.60)	(-3.11)			(7.54)	
RC	0.568*	-0.720*	-0.366*	-0.375*	0.75	28.4*	0.514*	1.88
	(7.34)	(-2.65)	(-6.60)	(-3.11)			(7.54)	

(   ) t values in paranthesis

1 Average Market Share 0.074

* significant at 0.01

Table 5. Results of the time series OLS regression with 36 observations for USX Corporation.

	Constant a_0	Market share a_1	P&E a_2	Raw Material a_3	Adj. R^2	F Stat.	Test Criterion T $a_0+a_1MS^1$	Durbin Watson
LIFOSLHC	0.875*	-0.189	-0.009	-0.948*	0.88	62.8*	0.829*	2.02
	(13.5)	(-1.52)	(-1.49)	(-12.9)			(4.13)	
LIFODDBHC	0.883*	-0.187	0.011	-0.958*	0.87	62.0*	0.838	2.03
	(13.00	(-1.49)	(-1.35)	(-13.0)			(3.99)	
FIFOSLHC	0.819*	-0.197	-0.013	-0.850*	0.71	22.4*	0.771	1.85
	(7.16)	(-0.68)	(-0.77)	(-6.40)			(10.2)	
FIFODDBHC	0.823*	-0.192	-0.018	-0.846*	0.74	22.4*	0.774	1.85
	(7.15)	(-0.66)	(-0.83)	(-6.50)			(10.4)	
RC	0.805*	-0.085	-0.010	-0.865*	0.76	30.3*	0.784	2.00
	(8.34)	(-0.48)	(-1.47)	(-7.56)			(10.35)	

(   ) t values in paranthesis

[1] Average Market Share 0.243

* significant at 0.01

Table 6. Results of the time series OLS regression with 36 observations for Lukens Steel Corporation.

	Constant a_0	Market share a_1	P&E a_2	Raw Material a_3	Adj. R^2	F Stat.	Test Criterion T a_0+a_1MS[1]	Durbin Watson
LIFOSLHC	0.426*	3.160	-0.033*	-0.348*	0.32	5.2*	0.442*	2.182
	(5.40)	(0.60)	(-2.12)	(-3.55)			(6.05)	
LIFODDBHC	0.418*	3.433	-0.030*	-0.344*	0.31	5.0*	0.435*	2.197
	(5.30)	(0.65)	(-2.02)	(-3.49)			(5.86)	
FIFOSLHC	0.864*	-6.570	-0.021	-0.930*	0.63	21.0*	0.840*	2.21
	(9.46)	(-1.10)	(-1.32)	(-7.34)			(8.83)	
FIFODDBHC	0.869*	5.850	-0.150	0.955*	0.66	15.5	0.840*	1.98
	(9.79)	(0.94)	(-1.04)	(-7.39)			(9.02)	
RC	0.432*	-0.655	-0.001*	-0.350*	0.36	6.0*	0.428	2.17
	(5.63)	-0.130	(-2.06)	(-3.79)			(6.43)	

(   ) t values in paranthesis

1 Average Market Share 0.005

* significant at 0.01

Table 7. Results of the time series OLS regression with 36 observations for LTV Corporation.

	Constant a_0	Market share a_1	P&E a_2	Rav Material a_3	Adj. R^2	F Stat.	Test Criterion T a_0+a_1MS	Durbin Watson
LIFOSLHC	0.295	0.467	-0.092	-0.200	0.67	18.1*	0.251	2.05
	(1.72)	(0.95)	(-4.30)	(-0.87)			(1.60)	
LIFODDBHC	0.331*	-0.055	0.100*	0.145	0.73	24.2*	0.326*	2.05
	(2.12)	(-0.12)	(-5.60)	(-0.73)			(2.38)	
FIFOSLHC	1.069*	-0.121	-0.059*	-1.209	0.82	38.7*	1.058	2.05
	(8.78)	(-0.16)	(-2.25)	(-10.0)			(12.49)	
FIFODDBHC	1.231*	-1.061	0.010*	-1.217	0.85	45.9*	1.220*	2.42
	(9.96)	(-1.44)	(-4.6)	(-13.02)			(15.6)	
RC	0.400*	0.462	0.065*	0.037	0.64	16.7*	0.443*	2.07
	(2.10)	(0.87)	(-3.52)	(-1.46)			(2.56)	

(   ) t values in paranthesis

[1] Average Market Share 0.0927

* significant at 0.01

Table 8. Results of the time series OLS regression with 36 observations for General Motor Corporation.

	Constant a_0	Market share a_1	P&E a_2	Raw Material a_3	Adj. R^2	F Stat.	Test Criterion T $a_0+a_1 MS$	Durbin Watson
LIFOSLHC	1.070*	-0.170	-0.005	-1.090	0.98	160*	0.997*	2.13
	(22.5)	(-0.17)	(-0.72)	(-69.9)			(46.1)	
LIFODDBHC	1.050*	-0.160	0.001	-1.070*	0.98	120*	0.984*	1.74
	(22.5)	(-1.63)	(0.09)	(-70.20)			(74.06)	
FIFOSLHC	1.150*	-0.218	0.003	-1.180*	0.92	130*	10.60*	2.15
	(12.8)	(-1.46)	(0.36)	(-17.0)			(20.8)	
FIFODDBHC	1.150*	-0.210	0.004	-1.182	0.91	130*	1.064*	2.15
	(12.9)	(-1.46)	(0.36)	(-16.95)				(20.4)
RC	1.079*	-1.126	-0.000	1.060*	0.93	185*	1.027*	2.07
	(17.1)	(-0.93)	(-0.46)	(145.0)			(55.8)	

(   ) t values in paranthesis

1 Average Market Share 0.410

* significant at 0.01

Table 9. Results of the time series OLS regression with 36 observations for the Ford Motor Company.

	Constant a_0	Market share a_1	P&E a_2	Raw Material a_3	Adj. R^2	F Stat.	Test Criterion T $a_0+a_1 MS^1$	Durbin Watson
LIFOSLHC	1.028*	-0.133	-0.011	-1.079*	0.94	184*	0.993*	1.96
	(19.7)	(-0.93)	(-0.57)	(-18.1)			(24.2)	
LIFODDBHC	1.020*	(-0.248	(-0.033	-1.006*	0.95	180*	0.956*	2.19
	(20.9)	(-1.85)	(-1.87)	(-14.8)			(21.8)	
FIFOSLHC	1.328*	-0.770*	0.073	-1.186*	0.82	53.0*	1.128*	2.65
	(11.2)	(-2.12)	(-1.48)	(-8.31)			(7.69)	
FIFODDBHC	1.298*	-0.675	-0.056	-1.17*	0.81	51.7*	1.123*	2.56
	(11.1)	(-1.91)	(-1.21)	(-7.22)			(7.78)	
RC	0.946*	-0.223	-0.038*	0.903*	0.88	88.5*	o.888*	2.58
	(13.7)	(-1.15)	(-2.69)	(-10.7)			(15.2)	

( ) t values in paranthesis

1 Average Market Share 0.260

* significant at 0.01

Table 10. Results of the time series OLS regression with 36 observations for American Motors Corporation.

	Constant a_0	Market share a_1	P&E a_2	Raw Material a_3	Adj. R^2	F Stat.	Test Criterion T $a_0+a_1M^1$	Durbin Watson
LIFOSLHC	0.826*	0.096*	0.058	-0.089*	0.72	31.7*	0.828*	2.68
	(7.28)	(2.31)	(1.59)	(-8.35)			(9.63)	
LIFODDBHC	0.825*	0.474	0.036	-0.910*	0.72	31.0*	0.834*	2.68
	(7.22)	(0.21)	(1.43)	(-8.27)			(6.98)	
FIFOSLHC	).69*	2.050	0.005	-0.740*	0.73	32.9*	0.717*	2.72
	(6.92)	(1.94)	(0.15)	(-7.94)			(9.03)	
FIFODDBHC	0.675*	2.150	-0.007	-0.736*	0.73	33.0*	0.715*	2.71
	(6.89)	(1.12)	(-0.33)	(-7.71)			(9.73)	
RC	0.866*	2.214	0.007	-0.989*	0.92	142	0.907*	2.93
	(15.6)	(1.96)	(0.45)	(-18.2)			(20.5)	

(   ) t values in paranthesis

1 Average Market Share 0.0187

* significant at 0.01

Table 11. Results of the time series OLS regression with 36 observations for Chrysler Corporation.

	Constant a_0	Market share a_1	P&E a_2	Raw Material a_3	Adj. R^2	F Stat.	Test Criterion T a_0+a_1MS	Durbin Watson
LIFOSLHC	0.597* (8.47)	0.925 (1.73)	0.031 (1.12)	-0.744* (-8.58)	0.87	68.9*	0.679* (8.83)	2.42
LIFODDBHC	0.598* (8.95)	0.615 (1.32)	0.012 (0.36)	-0.681* (-8.20)	0.89	53.1*	0.653* (9.02)	2.48
FIFOSLHC	0.533* (7.88)	0.012 (0.021)	-0.032 (-1.21)	-0.481* (-5.21)	0.87	58.1*	0.534* (7.82)	2.70
FIFODDBHC	0.525* (8.13)	0.014 (0.03)	-0/050 (-1.53)	-0.468* (-5.23)	0.87	60.1*	0.526* (8.86)	2.70
RC	0.760* (11.2)	0.728* (2.00)	0.014* (2.10)	-0.93* (-14.0)	0.89	69.7*	0.825* (9.50)	2.06

(   ) t values in paranthesis

[1] Average Market Share 0.089

* significant at 0.01

Table 12. Adjusted R^2 from the OLS estimation of equation (15).

Combination of Techniques	Firms of ARMCO	USX	LTV	LUKENS	GM	FORD	AMC	CHRYSLER
LIFOSLHC	0.69	0.88	0.67	0.32	0.98	0.94	0.72	0.87
LIFODDBSL	0.69	0.87	0.73	0.31	0.98	0.95	0.72	0.89
FIFOSLHC	0.80	0.71	0.82	0.63	0.92	0.82	0.73	0.87
FIFODDBHC	0.79	0.74	0.85	0.66	0.91	0.81	0.73	0.87
RC	0.75	0.75	0.66	0.36	0.93	0.88	0.92	0.89

_______ denotes reported combination of techniques.

Table 13. Test Criterion, a_0+a_1MS from the OLS estimation of equation (15).

Combination Techniques	Firms of ARMCO	USX	LTV	LUKENS	GM	FORD	AMC	CHRYSLER
LIFOSLHC	0.592	0.829	0.251	0.442	0.997	0.993	0.828	0.679
LIFODDBSL	0.596	0.838	0.326	0.435	0.984	0.956	0.834	0.653
FIFOSLHC	0.936	0.771	1.058	0.840	1.060	1.128	0.717	0.539
FIFODDBHC	0.936	0.784	1.220	0.840	1.064	1.298	0.715	0.526
RC	0.514	0.784	0.443	0.428	1.027	0.888	0.907	0.825

_______ denotes reported combination of techniques.

Table 14. Significance (Z-statistic) of individual coefficients.

Combination of Techniques	Constant a_0	Market Share a_1	P&E a_2	Raw Material a_3	Test criterion $T = a_0 + a_1$
LIFOSLHC	29.27**	-0.26	-3.38*	-43.30**	36.84**
LIFODDBHC	29.61**	-0.20	-4.08*	-41.97**	44.80**
FIFOSLHC	26.70**	-1.16	-3.49*	-24.04**	30.45**
FIFODDBHC	27.21**	-1.79	-3.38*	-22.97**	33.44**
RC	27.69**	-0.51	-4.87*	-33.40**	43.76**
Reported Combination	29.45**	-1.13	-5.43*	-40.90**	45.64**

* Significant at .01.
** Significant at .001.

Table 15. 't' test for difference in means of individual coefficients

Comparison	Coefficients a_0	a_1	a_2	a_3
LIFO vs. FIFO	**	**	**	**
SL vs. DDB	**	**	**	**
RC vs.HC	**	**	**	**

** significant at 0.01

Table 16. Adjusted R^2, analysis of variance for the 'Iron and Steel' industry.

Effect	Estimated F statistic	Critical value of F	Level of significance
Firm	11.5	$F_{3,12} = 5.95$	0.01
Accounting Method	1.52	$F_{4,12} = 3.25$	not significant

Table 17. Adjusted R^2, analysis of variance for the 'Automobile' industry.

Effect	Estimated F statistic	Critical value of F	Level of significance
Firm	6.22	$F_{3,12} = 5.95$	0.01
Accounting Method	1.21	$F_{4,12} = 3.25$	not significant

Table 18. Adjusted R^2, analysis of variance for the 'Iron and Steel' and the 'Automobile' industries.

Effect	Estimated F statistic	Critical value of F	Level of significance
Firm	23.97	$F_{7,28} = 3.36$	0.01
Accounting Method	0.54	$F_{4,28} = 4.07$	not significant

Table 19. Adjusted R^2, firm rankings, and Kendall's coefficient of concordance for the combined sample of the 'Iron and Steel and 'Automobile' industries.

Combination of Techniques	Firms							
	ARMCO	USX	LTV	LUKENS	GM	FORD	AMC	CHRYSLER
				Adusted R^2				
LIFOSLHC	0.69	0.88	0.67	0.32	0.98	0.94	0.72	0.87
LIFODDBSL	0.69	0.87	0.73	0.31	0.98	0.95	0.72	0.89
FIFOSLHC	0.80	0.71	0.82	0.63	0.92	0.82	0.73	0.87
FIFODDBHC	0.79	0.74	0.85	0.66	0.91	0.81	0.73	0.87
RC	0.75	0.75	0.66	0.36	0.93	0.88	0.92	0.89
				Ranks				
LIFOSLHC	6	4	8	7	1	2.5	5	2.5
LIFODDBHC	7	4	8	5	1	2	6	3
FIFOSLHC	5	7	8	3.5	1	3.5	6	2
FIFODDBHC	5	6	8	3	1	4	7	2
RC	5.5	5.5	7	8	1	4	2	3

Kendall's coefficient of concordance W = 0.7065
Value of S = 736.5
Value of = 24.5*

* significant at 0.01

Table 20. For the comparison LIFO vs.FIFO!SLHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Firms				
				Adjusted R^2				
LIFOSLHC	0.69	0.88	0.32	0.67	0.98	0.94	0.72	0.88
FIFOSLHC	0.80	0.71	0.63	0.82	0.92	0.82	0.73	0.87
				Ranks				
LIFOSLHC	5	3.5	7	6	1	2	4	3.5
FIFOSLHC	5	7	8	3.5	1	3.5	6	2

Spearman's Rank Correlation Coefficient r_s = 0.705*
* significant at 0.05

Table 21. For the comparison LIFO vs.FIFO!DDBHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Firms				
				Adjusted R^2				
LIFODDBHC	0.67	0.87	0.31	0.73	0.98	0.95	0.72	0.88
FIFODDBHC	0.79	0.74	0.66	0.85	0.91	0.81	0.73	0.87
				Ranks				
LIFODDBHC	7	4	8	5	1	2	6	3
FIFODDBHC	5	6	8	3	1	4	7	2

Spearman's Rank Correlation Coefficient r_s = 0.786*
* significant at 0.05

Table 22. For the comparison SL vs. DDB¦LIFOHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Firms							
	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Adjusted R^2				
SLLIFOHC	0.69	0.88	0.32	0.67	0.98	0.94	0.72	0.88
DDBLIFOHC	0.67	0.87	0.31	0.73	0.98	0.95	0.72	0.87
				Ranks				
SLLIFOHC	5	3.5	6	1	2	2	4	3.5
DDBLIFOHC	7	4	8	5	1	2	6	3

Spearman's Rank Correlation Coefficient r_s = 0.875*
* significant at 0.01

Table 23. For the comparison SL vs. DDB¦FIFOHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Firms							
	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Adjusted R^2				
SLFIFOHC	0.80	0.71	0.63	0.82	0.92	0.82	0.73	0.87
DDBFIFOHC	0.79	0.72	0.66	0.85	0.91	0.81	0.72	0.87
				Ranks				
SLFIFOHC	5	7	3.5	1	3.5	1	3.5	2
DDBFIFOHC	5	6.5	8	3	1	4	6.5	2

Spearman's Rank Correlation Coefficient r_s = 0.950*
* significant at 0.01

Table 24. For the comparison RC vs. HC!LIFOSL, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Firms							
	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Adjusted R^2				
RC	0.75	0.76	0.36	0.66	0.93	0.88	0.92	0.89
HCLIFOSL	0.69	0.88	0.32	0.67	0.98	0.94	0.72	0.87
				Ranks				
RC	6	5	8	7	1	4	2	3
HCLIFOSL	6	3	8	7	1	2	5	4

Spearman's Rank Correlation Coefficient r_s = 0.786*
*significant at 0.05

Table 25. For the comparison RC vs. HC!FIFOSL, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Firms							
	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Adjusted R^2				
RC	0.75	0.76	0.36	0.66	0.93	0.88	0.92	0.89
HCFIFOSL	0.80	0.71	0.63	0.82	0.92	0.82	0.73	0.87
				Ranks				
RC	6	5	8	7	1	4	2	3
HCFIFOSL	5	7	8	3.5	1	3.5	6	2

Spearman's Rank Correlation Coefficient r_s = 0.590

Table 26. For the comparison RC vs. HCO!LIFODDB, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Adjusted R^2				
RC	0.75	0.76	0.36	0.66	0.93	0.88	0.92	0.89
HCLIFODDB	0.67	0.87	0.31	0.73	0.91	0.81	0.73	0.87
				Ranks				
RC	6	5	8	7	1	4	2	3
HCLIFODDB	6	2.5	7	5.5	1	4	5.5	2

Spearman's Rank Correlation Coefficient r_s = 0.735*
* significant at 0.05

Table 27. For the comparison RC vs. HC !FIFODDB, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Adjusted R^2				
RC	0.75	0.76	0.36	0.66	0.93	0.88	0.92	0.89
HCFIFODDB	0.79	0.74	0.66	0.85	0.91	0.81	0.73	0.87
				Ranks				
RC	6	5	8	7	1	4	2	3
HCFIFODDB	5	6	8	3	1	4	7	2

Spearman's Rank Correlation Coefficient r_s = 0.476
Critical value of r_s at 0.05 level of significance = 0.643

Table 28. Adjjusted R^2, Spearman's rank correlation coefficient for the combined sample of the 'Iron and Steel' and 'Automobile' industries.

Comparison	Spearman's Rank Correlation Coefficient r_s
LIFO vs. FIFO: SLHC	0.705*
LIFO vs. FIFO: DDBHC	0.786*
SL vs. DDB : LIFOHC	0.862*
SL vs. DDB : FIFOHC	0.950*
RC vs. HCLIFOSL	0.786*
RC vs. HCFIFOSL	0.590
RC vs. HCLIFODDB	0.735*
RC vs. HCFIFODDB	0.476

* significant at the 0.05 level
** significant at the 0.01 level

TABLE 30. For the comparison LIFO vs. FIFO!SLHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Iron and Steel industry

Combination of Techniques	Firms: Armco	USX	Lukens	LTV
	Adjusted R^2			
LIFOSLHC	0.69	0.88	0.32	0.67
FIFOSLHC	0.80	0.71	0.63	0.82
	Ranks			
LIFOSLHC	2	1	4	3
FIFOSLHC	2	3	4	1

Spearman's Rank Correlation Coefficient r_s = 0.60
Critical value of r_s at 0.05 level of significance = 1.00

Table 31. For the comparisonLIFO vs. FIFO!DDBHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms: Armco	USX	Lukens	LTV
	Adjusted R^2			
LIFODDBHC	0.67	0.87	0.31	0.73
FIFODDBHC	0.79	0.74	0.66	0.85
	Ranks			
LIFODDBHC	3	1	4	2
FIFODDBHC	2	3	4	1

Spearman's Rank Correlation Coefficient r_s = -0.40
Critical value of r_s at 0.05 level of significance = 1.00

TABLE 32. For the comparison SL vs. DDB!LIFOHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
	Adjusted R^2			
SLLIFOHC	0.69	0.88	0.32	0.67
DDBLIFOHC	0.67	0.87	0.31	0.73
	Ranks			
SLLIFOHC	2	1	4	3
DDBLIFOHC	3	1	4	2

Spearman's Rank Correlation Coefficient r_s = 0.80
Critical value of r_s at 0.05 level of significance = 1.00

TABLE 33. For the comparison SL vs. DDB!FIFOHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
	Adjusted R^2			
SLFIFOHC	0.80	0.71	0.63	0.82
DDBFIFOHC	0.79	0.74	0.66	0.85
	Ranks			
SLFIFOHC	2	3	4	1
DDBFIFOHC	2	3	4	1

Spearman's Rank Correlation Coefficient r_s = 1.00*
* significant at 0.05

Table 34. For the comparison RC vs. HCLIFOSL, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Ajusted R^2		
RC	0.75	0.76	0.36	0.66
HCLIFOSL	0.69	0.88	0.32	0.67
		Ranks		
RC	2	1	4	3
HCLIFOSL	2	1	4	3

Spearman's Rank Correlation Coefficient r_s = 1.00*
*significant at 0.05

Table 35. For the comparison RC vs. HCFIFOSL, adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Adjusted R^2		
RC	0.75	0.76	0.36	0.66
HCFIFOSL	0.80	0.71	0.63	0.82
		Ranks		
RC	2	1	4	3
HCFIFOSL	2	3	4	1

Spearman's Rank Correlation Coefficient r_s = 0.60
Critical value of r_s at 0.05 level of significance = 1.00

Table 36. For the comparison RC vs. HCLIFODDB, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Adjusted R^2		
RC	0.75	0.76	0.36	0.66
HCLIFODDB	0.67	0.87	0.31	0.73
		Ranks		
RC	2	1	4	3
HCLIFODDB	3	1	4	2

Spearman's Rank Correlation Coefficient r_s = 0.80
Critical value of r_s at 0.05 level of significance = 1.00

Table 37. For the comparison RC vs. HCFIFODDB, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Adjusted R^2		
RC	0.75	0.76	0.36	0.66
HCLIFOSL	0.79	0.74	0.66	0.85
		Ranks		
RC	2	1	4	3
HCLIFOSL	2	3	4	1

Spearman's Rank Correlation Coefficient r_s = 0.60
Critical value of r_s at 0.05 level of significance = 1.00

Table 38. Adjusted R^2, Spearman's rank correlation coefficient for the Automobile industry.

Comparison	Spearman's Rank Correlation Coefficient r_s
LIFO vs. FIFO! SLHC	0.60
LIFO vs. FIFO! DDBHC	-0.40
SL vs.DDB! LIFOHC	0.80
SL vs. DDB! FIFOHC	1.00*
RC vs. HCLIFOSL	1.00*
RC vs. HCFIFOSL	0.60
RC vs. HCLIFODDB	0.80
RC vs. HCFIFODDB	0.60

* significant at 0.05

TABLE 39. Adjusted R^2, firm rankings, and Kendall's coefficient of concordance for the Automobile industry.

Combination of Tecnnifques	Firms			
	GM	FM	AMC	Chrysler
		Adjusted R^2		
LIFOSLHC	0.98	0.94	0.72	0.87
LIFODDBHC	0.98	0.95	0.72	0.88
FIFOSLHC	0.92	0.82	0.73	0.87
FIFODDBHC	0.91	0.81	0.73	0.87
RC	0.93	0.88	0.92	0.89
		Ranks		
LIFOSLHC	1	2	4	3
LIFODDBHC	1	2	4	3
FIFOSLHC	1	3	4	2
FIFODDBHC	1	4	3	2
RC	1	4	2	3

Kendall's Coefficient of Concordance W = 0.664
Value of S=83*
Critical value of S at 1.00 level of significance = 80.5
* significant at 0.01

Table 42. For the comparison SL vs DDB !LIFOHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms: GM	FM	AMC	Chrysler
		Adusted R^2		
SLLIFOHC	0.98	0.94	0.72	0.88
DDBLIFOHC	0.98	0.95	0.72	0.88
		Ranks		
SLLIFOHC	1	2	4	3
DDBLIFOHC	1	2	4	3

Spearman's Rank Correlation Coefficient r_s = 1.00*
* significant at 0.05

Table 43. For the comparison SL vs. DDB! FIFOHC, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms: GM	FM	AMC	Chrysler
		Adjusted R^2		
SLFIFOHC	0.92	0.82	0.73	0.87
DDBFIFOHC	0.91	0.81	0.73	0.87
		Ranks		
SLFIFOHC	1	3	4	2
DDBFIFOHC	1	3	4	2

Spearman's Rank Correlation Coefficient r_s = 1.00*
* significant at 0.05

Table 43. For the comparison RC vs. HCLIFOSL, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms: GM	FM	AMC	Chrysler
		Adjusted R^2		
RC	0.93	0.88	0.92	0.89
HCLIFOSL	0.98	0.94	0.72	0.87
		Ranks		
RC	1	4	2	3
HCLIFOSL	1	2	4	3

Spearman's Rank Correlation Coefficient r_s = 0.20
Critical value of r_s at 0.05 level of significance = 1.00

Table 45. For the comparison RC vs. HC! FIFOSL, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms: GM	FM	AMC	Chrysler
		Adjusted R^2		
RC	0.93	0.88	0.92	0.89
HCFIFOSL	0.92	0.82	0.73	0.87
		Ranks		
RC	1	4	2	3
HCFIFOSL	1	3	4	2

Spearman's Rank Correlation Coefficient r_s = 0.40
Critical value of r_s at 0.05 level of significance = 1.00

Table 46. For the comparison RC vs. HC! LIFODDB, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms GM	FM	AMC	Chrysler
		Adjusted R^2		
RC	0.93	0.88	0.92	0.89
HCLIFODDB	0.98	0.95	0.72	0.88
		Ranks		
RC	1	3	2	4
HCLIFODDB	1	2	4	3

Spearman's Rank Correlation Coefficient r_s = 0.40
Critical value of r_s at 0.05 level of significance = 1.00

TABLE 47. For the comparison RC vs. HC! FIFODDB, Adjusted R^2, firm rankings, and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms GM	FM	AMC	Chrysler
		Adjusted R^2		
RC	0.93	0.88	0.92	0.89
HCFIFODDB	0.98	0.95	0.72	0.88
		Ranks		
RC	1	3	2	4
HCFIFODDB	1	3	4	2

Spearman's Rank Correlation Coefficient r_s = 0.20
Critical value of r_s at 0.05 level of significance = 1.00

Table 48. Adjusted R^2, Spearman's rank correlation coefficient for the automobile industry

Comparison	Spearman's Rank Correlation Coefficient r_s
LIFO vs. FIFO! SLHC	0.80
LIFO vs. FIFO! DDBHC	0.80
SL vs.DDB! LIFOHC	1.00*
SL vs. DDB! FIFOHC	1.00*
RC vs. HCLIFOSL	0.20
RC vs. HCFIFOSL	0.40
RC vs. HCLIFODDB	0.40
RC vs. HCFIFODDB	0.20

* Significant at 0.05

Table 49. Test Criterion, firm rankings, and Kendall's coefficient of concordance for the 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Firms							
	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Test Criterion				
LIFOSLHC	0.592	0.892	0.442	0.251	0.997	0.993	0.828	0.679
LIFODDBHC	0.596	0.838	0.435	0.326	0.984	0.956	0.834	0.653
FIFOSLHC	0.936	0.771	0.840	1.058	1.060	1.128	0.717	0.534
FIFODDBHC	0.936	0.777	0.840	1.220	1.064	1.298	0.715	0.526
RC	0.514	0.784	0.428	0.443	1.027	0.888	0.907	0.825
				Ranks				
LIFOSLHC	6	3	7	8	1	2	4	5
LIFODDBHC	6	3	7	8	1	2	4	5
FIFOSLHC	4	6	5	3	2	1	7	8
FIFODDBHC	4	6	5	2	3	1	7	8
RC	6	5	8	7	1	3	2	4

Kendall's Coefficient of Concordance W = 0.507
Value of S=532
Value of = 17.73 *
Critical value of at 0.02 level of significance = 16.62
* significant at α = 0.02

Table 50. For the comparison LIFO vs. FIFO! SLHC, Test Criterion, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Test Criterion				
LIFOSLHC	0.592	0.829	0.442	0.251	0.997	0.993	0.828	0.679
FIFOSLHC	0.936	0.771	0.840	1.058	1.060	1.298	0.717	0.534
				Ranks				
LIFOSLHC	6	3	7	8	1	2	4	5
FIFOSLHC	4	6	5	3	2	1	7	8

Spearman's Rank Correlation Coefficient r_s = 0.262
Critical value of r_s at 0.05 level of significance = 0.643

Table 51. For the comparison LIFO vs. FIFO! DDBHC, Test Criterion, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Test Criterion				
LIFODDBHC	0.596	0.838	0.435	0.326	0.984	0.956	0.834	0.653
FIFODDBHC	0.936	0.777	0.840	1.220	1.064	1.298	0.715	0.526
				Ranks				
LIFODDBHC	6	3	7	8	1	2	4	5
FIFODDBHC	4	6	5	2	3	1	7	8

Spearman's Rank Correlation Coefficient r_s = 0.095
Critical value of r_s at 0.05 level of significance = 0.643

Table 52. For the comparison SL vs. DDB: LIFOHC, Test Criterion, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Test Criterion				
SLLIFOHC	0.592	0.829	0.442	0.251	0.997	0.993	0.828	0.679
DDBLIFOHC	0.596	0.838	0.435	0.326	0.984	0.956	0.834	0.653
				Ranks				
SLLIFOHC	6	3	7	8	1	2	4	5
DDBLIFOHC	6	3	7	8	1	2	4	5

Spearman's Rank Correlation Coefficient r_s = 1.000 *
* significant at 0.01

Table 53. For the comparison SL vs. DDB: FIFOHC, Test Criterion, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Test Criterion				
SLFIFOHC	0.936	0.771	0.840	1.058	1.060	1.128	0.717	0.534
DDBFIFOHC	0.936	0.777	0.840	1.220	1.064	1.298	0.715	0.526
				Ranks				
SLFIFOHC	4	6	5	3	2	1	7	8
DDBFIFOHC	4	6	5	3	2	1	7	8

Spearman's Rank Correlation Coefficient r_s = 1.000 *
* significant at 0.01

Table 54. For the comparison RC vs. HC! LIFOSL, Test Criterion, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Firms: Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
	Test Criterion							
RC	0.514	0.784	0.428	0.443	1.027	0.888	0.907	0.825
HCLIFOSL	0.392	0.829	0.442	0.251	0.997	0.993	0.828	0.679
	Ranks							
RC	6	5	8	7	1	3	2	4
HCLIFOSL	7	3	6	8	1	2	4	5

Spearman's Rank Correlation Coefficient r_s = 0.810*
* significant at 0.01

Table 55. For the comparison RC vs. HC!FIFOSL, Test Criterion, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Firms: Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
	Test Criterion							
RC	0.514	0.784	0.428	0.443	1.027	0.888	0.907	0.825
HCFIFOSL	0.999	0.819	0.864	1.069	1.060	1.128	0.717	0.534
	Ranks							
RC	6	5	8	7	1	3	2	4
HCFIFOSL	4	6	5	2	3	1	7	8

Spearman's Rank Correlation Coefficient r_s = -0.048
Critical value of r_s at 0.05 level of significance = 0.643

Table

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Test Criterion				
RC	0.514	0.784	0.428	0.443	1.027	0.888	0.907	0.825
HCLIFODDB	0.596	0.838	0.435	0.326	0.984	0.956	0.834	0.653
				Ranks				
RC	6	5	8	7	1	3	2	4
HCLIFODDB	6	3	7	8	1	2	4	5

Spearman's Rank Correlation Coefficient r_s = 0.8452*
* Significant at 0.01

Table 57. For the comparison RC vs. HC! FIFODDB, Test Criterion, firm rankings, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Combination of Techniques	Armco	USX	Lukens	LTV	GM	FM	AM	Chrysler
				Test Criterion				
RC	0.514	0.784	0.428	0.443	1.027	0.888	0.907	0.825
HCFIFODDB	0.936	0.777	0.840	1.220	1.064	1.298	0.715	0.526
				Ranks				
RC	6	5	8	7	1	3	2	4
HCFIFODDB	4	6	5	2	3	1	7	8

Spearman's Rank Correlation Coefficient r_s = -0.048
Critical value of r_s at 0.05 level of significance = 0.643

Table 58. Market power test Criterion, and Spearman's rank correlation coefficient for 'Iron and Steel' and 'Automobile' industries.

Comparison	Spearman's Rank Correlation Coefficient r_s
LIFO vs. FIFO! SLHC	0.262
LIFO vs. FIFO! DDBHC	0.095
SL vs.DDB! LIFOHC	1.00**
SL vs. DDB! FIFOHC	1.00**
RC vs. HCLIFOSL	0.810*
RC vs. HCFIFOSL	-0.048
RC vs. HCLIFODDB	0.845*
RC vs. HCFIFODDB	-0.048

* significant at .05
** significant at .01

Table 59. Test criterion, firm rankings, and Kendall's coefficient of concordance for the iron and steel industry

Combination of Techniques	Firms: Armco	USX	Lukens	LTV
		Test Criterion		
LIFOSLHC	0.592	0.829	0.442	0.251
LIFODDBHC	0.596	0.838	0.435	0.326
FIFOSLHC	0.936	0.771	0.840	1.058
FIFODDBHC	0.936	0.777	0.840	1.220
RC	0.514	0.784	0.428	0.443
		RANKS		
LIFOSLHC	2	1	3	4
LIFODDBHC	2	1	3	4
FIFOSLHC	2	4	3	1
FIFODDBHC	2	4	3	1
RC	2	1	4	3

Kendall's Coefficient of Concordance W = 0.168
Value of S=21
Critical value of S at 0.05 level of significance = 62.6

Table 60. For the comparison LIFO VS.FIFO:SLHC, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Test Criterion		
LIFOSLHC	0.592	0.829	0.442	0.251
FIFOSLHC	0.936	0.771	0.840	1.058
		Ranks		
LIFOSLHC	2	1	3	4
FIFOSLHC	2	4	3	1

Spearman's Rank Correlation Coefficient r_s = -0.80
Critical value of r_s at 0.05 level of significance = 1.00

Table 61. For the comparison LIFO VS.FIFO:DDBHC, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Test Criterion		
LIFODDBHC	0.596	0.838	0.435	0.326
FIFODDBHC	0.936	0.777	0.840	1.220
		Ranks		
LIFODDBHC	2	1	3	4
FIFODDBHC	2	4	3	1

Spearman's Rank Correlation Coefficient r_s = -0.80
Critical value of r_s at 0.05 level of significance = 1.00

Table 62. For the comparison SL VS. DDB:LIFOHC, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Armco	USX	Lukens	LTV
		Test Criterion		
SLLIFOHC	0.592	0.829	0.442	0.251
DDBLIFOHC	0.596	0.838	0.435	0.326
		Ranks		
SLLIFOHC	2	1	3	4
DDBLIFOHC	2	1	3	4

Spearman's Rank Correlation Coefficient $r_s = 1.00$*
* significant at .05

Table 63. For the comparison SL VS. DDB:FIFOHC, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Armco	USX	Lukens	LTV
		Test Criterion		
SLFIFOHC	0.936	0.771	0.840	1.058
DDBFIFOHC	0.936	0.777	0.840	1.220
		Ranks		
SLFIFOHC	2	4	3	1
DDBFIFOHC	2	4	3	1

Spearman's Rank Correlation Coefficient $r_s = 1.00$*
* significant at 0.05

Table 64. For the comparison RC VS. HCLIFOSL, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Test Criterion		
RC	0.514	0.784	0.428	0.443
HCLIFOSL	0.592	0.829	0.442	0.251
		Ranks		
RC	2	1	4	3
HCLIFOSL	2	1	3	4

Spearman's Rank Correlation Coefficient r_s = 0.80
Critical value of r_s at 0.05 level of significance = 1.00

Table 65. For the comparison RC vs. HCFIFOSL, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Test Criterion		
RC	0.514	0.784	0.428	0.443
HCFIFOSL	0.936	0.771	0.840	1.058
		Ranks		
RC	2	1	4	3
HCFIFOSL	2	4	3	1

Spearman's Rank Correlation Coefficient r_s = -0.40
Critical value of r_s at 0.05 level of significance = 1.00

Table 66. For the comparison RC vs. HCLIFODDB, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Test Criterion		
RC	0.514	0.784	0.428	0.443
HCLIFODDB	0.596	0.838	0.435	0.326
		Ranks		
RC	2	1	4	3
HCLIFODDB	2	1	3	4

Spearman's Rank Correlation Coefficient r_s = 0.80
Critical value of r_s at 0.05 level of significance = 1.00

Table 67. For the comparison RC vs. HCFIFODDB, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Iron and Steel industry.

Combination of Techniques	Firms			
	Armco	USX	Lukens	LTV
		Test Criterion		
RC	0.514	0.784	0.428	0.443
HCFIFODDB	0.936	0.777	0.840	1.220
		Ranks		
RC	2	1	4	3
HCFIFODDB	2	4	3	1

Spearman's Rank Correlation Coefficient r_s = -0.40
Critical value of r_s at 0.05 level of significance = 1.00

Table 68. Market power test criterion, firm rankings and Spearman's rank correlation coefficient for the Iron and Steel industry.

Comparison	Spearman's Rank Correlation Coefficient r_s
LIFO vs. FIFO: SLHC	-0.80
LIFO vs. FIFO: DDBHC	-0.80
SL vs.DDB: LIFOHC	1.00*
SL vs. DDB: FIFOHC	1.00*
RC vs. HCLIFOSL	0.80
RC vs. HCFIFOSL	-0.40
RC vs. HCLIFODDB	0.80
RC vs. HCFIFODDB	-0.40

* significant at 0.05

Table 69. Market power Test criterion, firm rankings and Kendall's coefficient of concordancefor the Automobile industry.

Combination of Techniques	Firms			
	GM	FM	AMC	Chrysler
		Test Criterion		
LIFOSLHC	0.997	0.993	0.828	0.679
LIFODDBHC	0.984	0.956	0.834	0.653
FIFOSLHC	1.060	1.128	0.717	0.534
FIFODDBHC	1.064	1.298	0.715	0.526
RC	1.027	0.888	0.907	0.825
		Ranks		
LIFOSLHC	1	2	3	4
LIFODDBHC	1	2	3	4
FIFOSLHC	2	1	3	4
FIFODDBHC	2	1	3	4
RC	1	3	2	4

Kendall's Coefficient of Concordance W = 0.80
Value of S=101*
Critical value of S at 0.05 level of significance = 62.6
Critical value of S at 0.01 level of significance = 80.5
* significant at .01

Table 68. For the comparison LIFO vs.FIFO:SLHC, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms			
	GM	FM	AMC	Chrysler
		Test Criterion		
LIFOSLHC	0.997	0.993	0.828	0.679
FIFOSLHC	1.060	1.298	0.717	0.534
		RANKS		
LIFOSLHC	1	2	3	4
FIFOSLHC	2	1	3	4

Spearman's Rank Correlation Coefficient r_s = 0.80
Critical value of r_s at 0.05 level of significance = 1.00

Table 71. For the comparison LIFO vs. FIFO! DDBHC, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms			
	GM	FM	AMC	Chrysler
		Test Criterion		
LIFODDBHC	0.984	0.956	0.834	0.653
FIFODDBHC	1.064	1.298	0.715	0.526
		Ranks		
LIFODDBHC	1	2	3	4
FIFODDBHC	2	1	3	4

Spearman's Rank Correlation Coefficient r_s = 0.80
Critical value of r_s at 0.05 level of significance = 1.00

Table 72. For the comparison SL vs. DDB! LIFOHC, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms			
	GM	FM	AMC	Chrysler
		Test Criterion		
SLLIFOHC	0.997	0.993	0.828	0.679
DDBLIFOHC	0.984	0.956	0.834	0.653
		Ranks		
SLLIFOHC	1	2	3	4
DDBLIFOHC	1	2	3	4

Spearman's Rank Correlation Coefficient r_s = 1.00*
* Significant at 0.05

Table 73. For the comparison SL vs. DDB!FIFOHC, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms			
	GM	FM	AMC	Chrysler
		Test Criterion		
SLFIFOHC	1.060	1.128	0.717	0.534
DDBFIFOHC	1.064	1.298	0.715	0.526
		Ranks		
SLFIFOHC	2	1	3	4
DDBFIFOHC	2	1	3	4

Spearman's Rank Correlation Coefficient r_s = 1.00 *
* significant at 0.05

Table 74. For the comparison RC vs. HCLIFOSL, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms			
	GM	FM	AMC	Chrysler
		Test Criterion		
RC	1.027	0.888	0.907	0.825
HCLIFOSL	0.997	0.993	0.828	0.627
		Ranks		
RC	1	3	2	4
HCLIFOSL	1	2	3	4

Spearman's Rank Correlation Coefficient r_s = 0.80
Critical value of r_s at 0.05 level of significance = 1.00

Table 75. For the comparison RC vs. HCFIFOSL, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms			
	GM	FM	AMC	Chrysler
		Test Criterion		
RC	1.027	0.888	0.907	0.825
HCFIFOSL	1.060	1.128	0.717	0.534
		Ranks		
RC	1	3	2	4
HCLIFOSL	1	2	3	4

Spearman's Rank Correlation Coefficient r_s = 0.40
Critical value of r_s at 0.05 level of significance = 1.00

Table 76. For the comparison RC vs. HCLIFODDB, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms			
	GM	FM	AMC	Chrysler
	Test Criterion			
RC	1.027	0.888	0.907	0.825
HCLIFODDB	0.984	0.956	0.834	0.653
	Ranks			
RC	1	3	2	4
HCLIFODDB	1	2	3	4

Spearman's Rank Correlation Coefficient r_s = 0.80
Critical value of r_s at 0.05 level of significance = 1.00

Table 77. For the comparison RC vs. HCFIFODDB, Test criterion, firm rankings and Spearman's rank correlation coefficient for the Automobile industry.

Combination of Techniques	Firms			
	GM	FM	AMC	Chrysler
	Test Criterion			
RC	1.027	0.888	0.907	0.825
HCFIFODDB	1.064	1.298	0.715	0.526
	Ranks			
RC	1	3	2	4
HCFIFODDB	2	1	3	4

Spearman's Rank Correlation Coefficient r_s = 0.40
Critical value of r_s at 0.05 level of significance = 1.00

Table 78. Market Power Test criterion, firm rankings and Spearman's rank correlation coefficient for the Automobile industry.

Comparison	Spearman's Rank Correlation Coefficient r_s
LIFO vs. FIFO! SLHC	0.80
LIFO vs. FIFO! DDBHC	0.80
SL vs.DDB! LIFOHC	1.00*
SL vs. DDB! FIFOHC	1.00*
RC vs. HCLIFOSL	0.80
RC vs. HCFIFOSL	0.40
RC vs. HCLIFODDB	0.80
RC vs. HCFIFODDB	0.40

* significant at .01

VII CONCLUSIONS

As is analyzed in the previous section, accounting methods do not seem to have a significant effect on the relevant parameters of estimation, when analyzed jointly for the complete sample of firms (results from the analysis of variance and the Kendall's coefficient of concordance tests). From the more disaggregate pairwise analysis with Spearman's rank correlation coefficient, however, it is very clear that changes in certain accounting techniques have a very significant effect on the ranking of firms both by market power as well as by the goodness of fit of the model. In the context of the model developed in the study, the techniques with the most effects are the changes in inventory measurement techniques i.e. from LIFO to FIFO. These results are contrary to the results obtained by Nair [1979]] in that his study did not show significant effects due to accounting techniques.

The results of this study emphasize to the importance of paying attention to the uderlying accounting data when intercomparisons of a test criterion or goodness of fit are made. Since in no case did the same accounting technique give the best rank for all firms, it points to the fact that intercomparisons of results when different techniques are used by the firms can be very misleading.

This study also points out an important fact that was overlooked in the earlier study by Hagerman and Senbet[1975] in that it is not sufficient to look at aggreagated crossectional results when the research question is at the disaggregate firm level. So their research finding that on averagae most firms in an industry use the same accounting methods is not relevant when examining firms in industries where different accounting methods are used. In that case intercomparisons of estimated data without regard to the underlyling techniques can lead to misleading analyses. However, the question as to which techniques need to be paid attention to depends on the model being tested and the particular firms involved in the intercomparison. Since the model that was developed in this study dealt with the dependent as well as the independent variables involving measurement of inventories, it is not surprising that in most cases the change of LIFO to FIFO and vice versa had the most profound effect.

The effects of techniques on the goodness of fit of the estimated model has implications when making intermodel comparisons as Nair did, or when testing the validity of a particular economic model. As this study shows, the explanatory power of the model does depend on the particular accounting techniques underlying the data.

In this study, an attempt has been made to examine two questions. Referring to the diagramme on page 4, the two questions of interest are, (1) whether the measurement model B that is based on accounting measurements captures the same phenomenon as the unobservable model A, and (2) whether the accounting model is sensitive to alternative accounting methods underlying the dependent and the independent variables.

The normative answer to the first question is that if the economic phenomenon is to be measured by accounting numbers, it is important to model that phenomenon of interest in terms of the definitions that accountants use. For example inventories should be modeled and not assumed nonexistant if accounting measurement of the Sales Revenue and the Cost of Goods sold is involved.

The empirical answer to the second question is that at the micro level of an individual firm where the differences due to accounting techniques are not aggregated out as in the case of industry level analysis, it is very important to be aware of the accounting techniqes that might impact on the dependent and the explanatory variables.

Finally this study has attempted to analyze the effects of accounting techniques from the perspective of impact on decision rules in the case where accounting data is actually used. In the light of the results from this study it would be worthwhile to study and develope other models that are more suited for measurement with accounting variables.

VIII APPENDIX

The decision problem is to maximize eqn. (7) in the text, i.e.,

$$\max_{[L,I,R_t,S_{t+1},\bar{Q}]} P(S_{t+1},\bar{Q})\bar{Q} - WL - C^F(S_{t+1}) - C^R(Sr_t + R_t)$$

$$- \mu_\gamma P_\theta^K(K_E + I) - \mu_\Delta b_\theta^R(Sr_t + \bar{R}_t)$$

$$+ (1/1+r^*)\ P(S_{t+1},\bar{Q})S_{t+1}$$

$$\text{s.t.}\quad S_t + Q(K_E + I,\ L,\ Sr_t + R_t) = \bar{Q} + S_{t+1}$$

Where, $Q(K_E + I,\ L,\ Sr_t + R_t)$ = Quantity of finished goods manufactured.

Forming the Lagrangian L_*,

Max $L^* =$

$$\max_{[L,I,R_t,S_{t+1},Q]} P(S_{t+1},\bar{Q})\bar{Q} - WL - C^F(S_{t+1}) - C^R(Sr_t + R_t)$$

$$- \mu_\gamma P_\theta^K(K_E + I) - \mu_\Delta b_\theta^R(Sr_t + R_t)$$

$$+ (1/1+r^*)\ P(S_{t+1},\bar{Q})S_{t+1}$$

$$+ \mu(St + Q(K_E + I,\ L,\ Sr_t + \bar{R}_t) - \bar{Q} - S_{t+1})$$

First order conditions are,

$\bar{Q}$: $\delta P\bar{Q}/\delta\bar{Q} - \mu = 0$

i.e. Marginal Revenue = μ = Marginal cost

therefore, $\mu = MC$ (A.1)

S_{t+1}: $(\delta P/\delta S_{t+1})(\bar{Q} + (1/1+r^{*})St+1) - C^{F} - \mu = 0$

or, $(\delta P/\delta S_{t+1})(\bar{Q} + (1/1+r^{*})St+1) = C^{F} + \mu$ (A.2)

Here $\bar{Q}\delta P/\delta S_{t+1}$ is the marginal revenue due to holding an extra unit of finished goods inventory.

I: $\mu_{\gamma}P_{0}^{K}/MP_{K} - \mu\delta Q/\delta I = 0$

or, $\mu_{\gamma}P_{0}^{K}/MP_{K} = \mu$ (A.3)

where $MP_{K} = \delta Q/\delta I$ is the marginal product of capital other than raw materials.

$\bar{R}_{t}$: $- C^{R} - \mu_{\Delta}b_{0}^{R} + \mu\delta Q/\delta R = 0$

or, $(C^{R} + \mu_{\Delta}b_{0}^{R})/MP_{R} = \mu$ (A.4)

where $MP_{R} = \delta Q/\delta R$ is the marginal product of raw materials.

L: $- W + \mu\delta Q/\delta L = 0$

or, $W/MP_{L} = \mu = MC$ (A.5)

Where $MP_{L} = \delta Q/\delta L$ is the marginal product of labor.

Therefore, from the first order conditions (A.1), (A.3), (A.4), and (A.5),

$$\mu = MC = \mu_{\gamma}P_{0}^{K}/MP_{K} = (C_{R} + \mu_{\Delta}b_{0}^{R})/MP_{R} = W/MP_{L} \quad (A.6)$$

It is important to note here that in the model incorporating market power, the first order condition with respect to S_{t+1}, the finished goods ending inventory, is not used. This is similar to the treatment of advertising expense in a model proposed by Savyer [1983][A1] in which the advertising is not a part of the final model of market power. Another way of thinking about this is that the marginal cost of holding finished goods inventory is a selling cost rather than a cost of production, and therefore is not a part of the factors of production, AC in eqn. (3).

Multiplying equations (A.3), (A.4), and (A.5) with $K = K_E + I$, L, and $R = R_t + Sr_t$(raw materials available), respectively, and adding gives,

$$(KMP_K + RMP_R + LMP_L)MC = \mu_\gamma P_\theta^K K + \mu_\Delta b_\theta^R R + C^R R + WL$$

or, $$MC = \frac{\mu_\gamma P_\theta^K K + \mu_\Delta b_\theta^R R + C^R R + WL}{Q} \frac{Q}{(KMP_K + RMP_R + LMP_L)}$$

or[2A], $$MC = \frac{\mu_\gamma P_\theta^K K + \mu_\Delta b_\theta^R R + C^R R + WL}{Q} \frac{1}{FC}$$

Substituting for MC in eqn. (2), we get,

$$\frac{P - \dfrac{\mu_\gamma P_\theta^K K + \mu_\Delta b_\theta^R R + C^R R + WL}{Q} \dfrac{1}{FC}}{P} = \frac{1}{\epsilon_{QP}}$$

The above equation on simplification gives,

$$PQ = \frac{PQ}{\epsilon_{QP}} + \frac{\mu_{\gamma} P_{\theta}^{K} K + \mu_{\Delta} b_{\theta}^{R} R + C^{R} R + WL}{FC}$$

Multiplying both sides of the equation by FC/PQ and adding 1 gives,

$$1 + FC = 1 + \frac{FC}{\epsilon_{QP}} + \frac{\mu_{\gamma} P_{\theta}^{K} K + \mu_{\Delta} b_{\theta}^{R} R + C^{R} R + WL}{PQ}$$

$$\text{or,} \quad 1 = 1 + FC[\frac{1}{\epsilon_{QP}} - 1] + \frac{\mu_{\gamma} P_{\theta}^{K} K + \mu_{\Delta} b_{\theta}^{R} R + C^{R} R + WL}{PQ}$$

Multiplying throughout by 1 = PQ/PQ and subtracting from both sides $(WL + C^{R}R + bR_{t})$, the cost of goods manufactured,

$$\frac{PQ - WL - C^{R}R - bR_{t}}{PQ} = 1 + FC[\frac{1}{\epsilon_{QP}} - 1] + \frac{\mu\gamma P_{\theta}^{K} K}{PQ} + \frac{\mu_{\Delta} b_{\theta}^{R} R}{PQ} - \frac{bR_{t}}{PQ} \qquad (A.7)$$

Here R_t is the quantity, and b is the price of raw materials actually used in production. It is important to note that if the price of raw materials $_R$ actually used $b \approx b_{\theta}^{R}$, the actual situation will approximate a FIFO inventory measurement technique, and likewise $b \approx b_{1}^{R}$ will approximate LIFO. Examining the FIFO case[A3] by sustituting b for b_{θ}^{R}, eqn. (A.7) is equivalent to,

$$\frac{PQ - AC.Q}{PQ} = 1 + FC[\frac{1}{\epsilon_{QP}} - 1] + \frac{\mu_\gamma P_\theta^K K}{PQ} + \frac{\mu_\Delta bR}{PQ} - \frac{bR_t}{PQ} \quad (A.8)$$

In order to extend this case of a single seller to a differentiated product, oligopoly setting, $[\epsilon_i \alpha + S_i(1 - \alpha)]/\epsilon_i$ is substituted for $1/\epsilon_{PQ}$ A4 in the above eqn., which gives,

$$\frac{PQ - WL - C^R R - bR_t}{PQ} = (1 - FC + \frac{\alpha}{\epsilon_i}) + \frac{(1 - \alpha)FC}{\epsilon_i} S_i + \frac{\mu_\gamma P_\theta^K K}{PQ} + \frac{\mu_\Delta bR}{PQ} - \frac{bR_t}{PQ} \quad (A.9)$$

Here I make a simplifying assumption that the total raw materials available are proportional to total materials used in production, i.e. $R = hR_t$ where h is a constant. This implies that the raw materials ending inventory $Sr_{t+1} = (h - 1)R_t$, or that the raw materials ending inventory is kept at some constant multiple of the optimal quantity of raw materials available.

While this may not be the exact scenario for every firm, it is a plausible story for a feasible inventory policy. Substituting hR_t for R in eqn. (A.8) and combining the last two terms on the right hand side,

$$\frac{PQ - WL - C^R R - bR_t}{PQ} = (1 - FC + \frac{\alpha}{\epsilon_i}) + \frac{(1 - \alpha)FC\ S_i}{\epsilon_i} + \frac{\mu\gamma P_\theta^K K}{PQ} + (h\mu_\Delta - 1)\frac{bR_t}{PQ} \quad (A.10)$$

The left hand side in the above equation is equal to gross profit if all of the goods manufactured are sold. In order to measure accounting gross profit which in terms of the quantity of goods actually sold instead of quantity of goods manufactured, both sides of the equation are mutiplied by, $(\bar{Q}/Q)/(\bar{Q}/Q)$.

Now the left hand side of eqn. (A.10) becomes,

$$\frac{(P - AC)\ \bar{Q}}{P\bar{Q}} = \frac{\text{Accounting Sales Revenue} - \text{Accounting Cost of goods sold}}{\text{Accounting Sales Revenue}}$$

and the right hand side becomes,

$$(1 - FC + \frac{\alpha}{\epsilon i}) + \frac{(1 - \alpha)FC\ Si}{\epsilon i} + \frac{\mu\gamma P_\theta^K K}{P\bar{Q}}\frac{\bar{Q}}{Q} + \frac{bR_t}{P\bar{Q}}\frac{\bar{Q}}{Q}[h\ \mu\Delta - 1]$$

To evaluate $\bar{Q}/Q$, $P_\theta^K K\ \bar{Q}/Q$, and $bR_t\ \bar{Q}/Q$.

1. $\bar{Q}/Q$: $Q - \bar{Q} = S_{t+1} - S_t$

Multiplying both sides by AC

$$AC(Q - \bar{Q}) = AC(S_{t+1} - S_t)$$

= Change in finished goods inventories (ΔI in dollars) when both inventories are measured in current prices.

Therefore, $\Delta I = AC\ \bar{Q}(Q/\bar{Q} - 1)$

On simplification this gives,

$$\frac{\bar{Q}}{Q} = \frac{1}{(\Delta I/CGS + 1)}$$

2. $P_0^K K\ \bar{Q}/Q$:

Substituting for $\bar{Q}/Q$ from the last equation,

$$P_0^K K\ \bar{Q}/Q = \frac{1}{(\Delta I/CGS + 1)} P_0^K K$$

= Amount of capital other than raw materials (i.e. Plant and Equipment at current prices at the beginning of the period) to be allocated to the finished goods actually sold.

3. $b\bar{R}_t\ \bar{Q}/Q$:

now $Sr_t + \bar{R}_t = R_t + Sr_{t+1}$,

and $R_t\ \bar{Q}/Q = \bar{R}$ = quantity of raw materials actually used in the goods sold.

Therefore substituting for R_t and $R_t\ \bar{Q}/Q$

$$b\bar{R} = b(Sr_t + \bar{R}_t - Sr_{t+1})\ \bar{Q}/Q$$

$$= [b(Sr_t - Sr_{t+1}) + b\bar{R}_t]\ \bar{Q}/Q$$

= [Change in value of raw materials inventories valued at $b = b_0$ + Purchases of raw materials] $\frac{\text{Quantity sold}}{\text{Quantity manufactured}}$

Substituting for $\bar{Q}/Q$, $P_{\theta}^{K}K\ \bar{Q}/Q$, and $bR_t\ \bar{Q}/Q$. in eqn (A.11),

$$\frac{\text{Accounting Gross Profit}}{\text{Sales}} = (1 - FC + \frac{\alpha FC}{\epsilon_i}) + (\frac{1-\alpha}{\epsilon_i})FC.Si + \mu_{\gamma}[\frac{1}{\frac{\Delta I}{CGS}+1}]\frac{\text{Plant and Equipment}}{\text{Sales}}$$

$$+ (h\mu_{\Delta} - 1)[\frac{1}{\frac{\Delta I}{CGS}+1}]\left[\frac{\text{Change in the values of raw material inventories} + \text{raw material purchases}}{\text{Sales}}\right] \quad (A.12)$$

IX FOOTNOTES

1 In 1972 and 1973, for example, Senator Phillip Hart introduced an Industrial Reorganization Act under which one of the indicators of monopoly power was when a company's after tax return on stockholders' equity exceeded 15 percent for five consecutive years (Goldschmidt, Appendix B).

2 Hagerman and Senbet [1976], Nair[1979].

3 See Weiss [1974] for a review of 46 papers and Benston [1973,1985] for a reveiw of about 20 more.

4 Concentration can be defined as the percentage of total industry sales contributed by the largest firms, ranked in the order of market share.

5 Professor Lerner proposed an index of monopoly power as:

$$\frac{\text{price-marginal cost}}{\text{price}}$$

here the degree of monoply power depends on the divergence between price and marginal cost

6 The FOC's give,

$$\partial\pi/\partial Q = P'(Q)Q + P(Q) - C'(Q) = 0$$

$$\text{i.e. } -P'(Q)Q/P = \{P(Q) - C'(Q)\}/P$$

$$\text{or, } -(dQ/Q)/(dP/P) = 1/\epsilon_{QP} = \{P(Q) - C'(Q)\}/P$$

7 α can be thought of as a kind of elasticity of the rival's output with respect to firm's own. So $\alpha = 1$ implies that the rival firms imitate the firm's actions in the same proportion, while $\alpha > 1$ implies a greater degree of collusion (Martin[1985])

8 Inclusion of the last period's inventory s_t at last period's price $p_{t-1}(Qt-1, s_t)$ will not change the model as none of the variables feature in this period's decision problem.

9 The "one period" model given by eqn.(6) gives the same results as the dynamic version. This can be

seen by setting up the dynamic version of the PDV as,

$$-P_0^{K_1}K_1 - b_0^{K_2}K_2 + \int_{t=1}^{\infty}(1/1+r^*)^t \; P_t(S_{t+1}, \bar{Q}_t)\bar{Q}_t - W_tL_t$$

$$- C^F(S_{t+1}) - C^R(K_{2,t+1}) - P_t^{K_1}(K_{1,t+1} - (1-\delta)K_{1,t})$$

$$- b_t^{K_2}(K_{2,t+1} - (1-\Delta)K_{2,t})$$

here K_1 and K_2 are the two kinds of capital (i.e. long lived assets and raw materials respectively). Collecting $K_{1,t}$ and $K_{2,t}$ terms inside the integration and using the definitions of $_\delta$ and $_\Delta$, we get,

$$PDV = \int (1/1+r^*)^t P_t(S_{t+1}, \bar{Q}_t)\bar{Q}_t - W_tL_t - C^F(S_{t+1})$$
$$- C^R(K_{2,t+1}) - \mu_{\delta,t}P_{t-1}^{K_1}K_{1,t} - \mu_{\Delta,t}b_{t-1}^{K_2}K_{2,t}$$

For optimising purposes this is the same as equation (7). This result follows from Arrow's[1964] Myopia principle which states that,

> "---the most striking feature of the optimal policy is it's independence of future movements of the profit function------.
> This myopic property of the optimal capital policy implies a considerable economy of information needs in a firm's decision making process."
> (Arrow [1964],pp.27-8.)

Also when the model is developed to incorporate imperfect markets, the test for market power essentially is the same as the test that is developed here. For a complete treatment see Martin [1985].

10 It is interesting to note here that if one was to assume constant returns to scale, i.e. FC = 1, the testfor market power would be of the form $a_0 + a_1S_i > 0$.

11 The correct definition and measurement of market share is an unresolved issue in Industrial economics literature, and is not in the scope of this study.

12 Errors in the context of the model in this study refer to the differences that are introduced in variables such as value of inventories, CGS, and plant and equipment when alternative accounting techniques are used.

13 Note that Replacement cost restatement implicitly includes the LIFO method of inventory measurement.

14 See Judge pp. 515.

15 The error in this variable is only due to techniques such as LIFO vs. FIFO, and HC vs. RC. This error is equal to 'zero' if the percentage difference introduced in the CGS is the same as the percentage difference introduced in the ending inventory.

16 There is support in the literature for the existence of constant returns to scale(see Scherer, chapter 4 for a good review).

17 The quarterly data filed with the SEC is peferable to the quarterly compustat data as the latter can introduce biases when trying to estimate the ages of the long term assets (see Thies and Revsine[1977].

18 Source-Weiss [1974] (pp. 187).

19 Adjusted $R^2 = (1-(1-R^2))(N-1)/(N-K)$
where R^2 = Unadjusted coefficient of the goodness of fit of a model
N = Number of observations
K = Number of parameters estimated

20 This reversal of the null from the hypotheses formulated earlier results in a loss of power of the test statistic. However there is precedence for such a procedure in the finance literature where the only way to test for market efficiency is to have a null of market efficiency (no information effect) and then accept it if there is no information effect..

FOOTNOTES APPENDIX

A.1 In the model proposed by Savyer[1983], profits of a firm are,

$\pi = P(\bar{A},Q) - C(Q) - P^A A$, maximising the F.O.C. is, $\partial\pi/\partial Q$ = MR = MC which is equivalent to, $P(1 - 1/\epsilon)$ = MC. Assuming constant returns to scale and substituting AC for MC in the above equation gives, $(P - AC)/PQ = 1/\epsilon$ which is euqivalent to $(PQ - C(Q))/PQ = 1/\epsilon$. This is the Price cost margin or the Lener index. This measure of market power does not incorporate the advertising cost.

A.2

$$\frac{Q}{KMP_K + LMP_L + RMP_R} = \frac{Q}{\text{Total number of goods produced assuming that each unit produced was the marginal unit.}}$$

Multiplying both sides of the above equation with 1 = MC/MC gives,
Q.MC/Total cost = Q.MC/Q.AC =1/FC .

A.3 For the LIFO case exactly the same results follow except that a new implicit cost of rental for capital consisting of raw materials is defined as,

$$\mu_\Delta' = \mu_\Delta b_\theta^R / b_1^R$$

and now $b_1^R \approx b$ is the cost of materials used in production.

A.4 Same transformation as from eqn. (4) to eqn. (5).

X BIBLIOGRAPHY

Adams, Walter, The Structure of American Industry. New York, McMillan, 1970.

Ayanian, R. "Advertising and Rate of Return." Journal of Law and Economics (October 1975):479-506.

Ball R. and G. Foster, "Corporate Financial Reporting: A Methodological Review of Empirical Research." Journal of Accounting Research, Supplement(1982): 161-234.

Beaver, W. H., and Demski, J. S. " The Nature of Income measurement." The Accounting Reveiw 74(1979);38-46.

Benston, G. J. "The Validity of Profits-Structure Studies with Particular Reference to the FTC's Line of Business." American Economic Review (March 1985): 37-67.

Bloch, H. "True Profitability Measures for Pharmaceutical Firms." In Regulation, Economics, and Pharmaceutical Innovation, edited by J. D. Cooper, pp. 147-57. Washington, D.C.: American University, 1976.

Chambers, R. J. Accounting, Evaluation, and Economic Behaviour. Englewood Cliffs, N.J. : Prentice Hall, 1966.

Clarkson, K. W. Intangible Capital and Rates of Return. Washington D.C. : American Enterprise Institute for Public Policy Research, 1977.

Cowling, K., and Waterson, M. "Price Cost Margins and Market structure." Economica 43(May 1976):267-74.

Dhaliwal, D., Salamon, G., and Smith, E. D., "The Effects of Owner versus Management Control on the Choice of Accounting Methods." Journal of Accounting and Economics 4(July 1982): 41-53.

Dopuch, N., and Drake, D. F. "The Effect of Alternative Accounting Rules for Nonsubsdiary Investments." Empirical Research in Accounting: Selected Studies, 1966. Supplement to Journal of Accounting Research 4: 192-219.

__________, and Pincus, M. "Uniformity vs. Comparability: Time Series Analysis of LIFO vs. FIFO Firms' Earnings and Gross Margins." Working paper, Washington University(December 1984).

__________, and Watts, R. "Using Time Series Models to Assess the Significance of Accounting Changes." Journal of Accounting Research 10(Spring 1972): 188-94.

__________, and Drake, D. F. "The Effect of Alternative Accounting Rules for Nonsubsidiary Investments." Empirical Research in Accounting: Selected Studies, 1966. Supplement to Journal of Accounting Research 4: 192-219.

Edwards, E. O., and Bell, P. W. The Theory and Measurement of Business Income. Berkley: University of California Press, 1965.

Falkenstein, A., and Weil, R.L. "Replacement Cost Accounting: What will Income Statements Based on the SEC Disclosures Show?-Part I and II." Financial Analysts Journal (Jan-Feb 1977):46-57,and (March-April):48-57.

Fisher, F. M., and McGowan, J. J. "On the Misuse of Accounting Rates of Return to infer Monopoly Profits." American Economic Review 73(March 1983): 82-97.

Gonedes, N. J., and Dopuch, N. "Capital Market Equilibrium, Information Production and Selecting Accounting Techniques: Theoretical Framework and review of Empirical Work." Studies on Financial Accounting Objectives: 1974. Supplement to Journal of Accounting Research 12: 48-169.

______________________________ "Economic Analyses and Accounting Techniques: Perspective and Proposals." Journal of Accounting Research 17(Autumn 1979): 384-410.

Greenball, M. "The Accuracy of Different Methods of Accounting for Earnings: A simulation Approach." Journal of Accounting Research 6(Spring 1968): 114-29.

Greenball, M. "Appraising Alternative Methods of Accounting for Accelerated Tax Depreciation: A Relative Accuracy Approach." Journal of Accounting Research 7(Autumn 1969);262-89.

Hagerman, R., and Senbet, L. "A test of Accounting Bias and Market Structure." Journal of Business 49(October 1976): 509-13.

__________, and Zmijewski, M. "Some Economic Determinants of Accounting Policy Choice." Journal of Accounting and Economics 3(August 1979):141-61.

Harcourt, G.C. "The Accountant in a Golden Age." Oxford Economic Papers 17(March 1965): 66-88.

Kennedy, C. "Inflation Accounting: Retrospect and Prospect." Cambridge Economic Policy Reveiw, No. 4(1978): 58-64. Revised 1984.

Livingston, J. L., and Salamon, G. L. "Relationship Between the Accounting and the Internal Rate of Return Measures: A synthesis and an analysis."Journal of Accounting Research 8(Autumn 1970): 199-216.

Long, W. F., and Ravenscraft, D. J. " The Usefulness of Accounting Profit Data: A comment on Fisher and McGowan." American Economic Review 74(June 1984): 494-500.

Martin, S. "The Misuse of Accounting Rates of Return: Comment."American Economic Review 74(June 1984): 501-6.

__________ "The Measurement of Profitability and the Diagonosis of Market Power." Working Paper: Michigan State University, (Oct. 1985).

Meyers, J. L. Fundamentals of Experimental Design. Boston: Allyn and Bacon, 1972

Nair, R.D. "Methods for Restating Inventory and Depreciation Numbers." Working Paper No. 15. University of Michigan (Oct. 1977)

__________ "Economic Analyses and Accounting Techniques: An Empirical Study." Journal of Accounting Research (Spring 1979): 225-42.

Paton, W. A., and Littleton, A. C. An Introduction to Corporate Accounting Standards. New York: American Accounting Association, 1940.

Peterson, Russell J. "General Price-Level Impact on Financial Information." The Accounting Review 48(January 1973): 34-43.

Rosenfield, P. "Accounting for Inflation-A field test." Journal of Accountancy (June 1969):45-50.

Salamon, G. L. "Accounting Rates of Return." American Economic Review 75 (June 1985): 495-504.

Savyer, M.C. "On the Specification of Structure Relationships." Europeon Economic Review 17(March 1983): 295-306.

Scherer, F. M. Industrial Market Structure and Economic Performance. Boston, Houghton Mifflin Co., 1980.

Seigel, S. Nonparametric Statistics for the Behavioral Sciences. York, Pa.: The Maple Press, 1956.

Simmons, J. K., and Gray, J. "An investigation of the Effect of Differing Accounting Frameworks on the Prediction of Net Income." The Accounting Review 44(October 1969): 757-76.

Thies, J. B., and Revsine, L. " Capital Expenditure Data for Inflation Accounting Studies." The Accounting Review (Jan. 1977):216-21.

Watts, R., and Zimmerman, J. "Towards a Positive Theory of the Determination of Accounting Standards." The Accounting Review 53(January 1978): 112-34.

Weiss, L. W. "Advertising, Profits, and Corporate Taxes." Review of Economics and Statistics(Nov. 1969):421-30.

____________ "The Concentration Profits Relationship in Antitrust." in Harvey Goldschmidt et al. eds. Industrial Concentration: The New Learning, Boston: Little Brown and Co., 1974:L 184-223.

Salamon, G. L. "Accounting Rates of Return." American Economic Review 75 (June 1985): 495-504.

Savyer, M.C. "On the Specification of Structure Relationships." Europeon Economic Review 17(March 1983): 295-306.

Scherer, F. M. Industrial Market Structure and Economic Performance. Boston, Houghton Mifflin Co., 1980.

Seigel, S. Nonparametric Statistics for the Behavioral Sciences. York, Pa.: The Maple Press, 1956.

Simmons, J. K., and Gray, J. "An investigation of the Effect of Differing Accounting Frameworks on the Prediction of Net Income." The Accounting Review 44(October 1969): 757-76.

Thies, J. B., and Revsine, L. " Capital Expenditure Data for Inflation Accounting Studies." The Accounting Review (Jan. 1977):216-21.

Watts, R., and Zimmerman, J. "Tovards a Positive Theory of the Determination of Accounting Standards." The Accounting Review 53(January 1978): 112-34.

Weiss, L. W. "Advertising, Profits, and Corporate Taxes." Review of Economics and Statistics(Nov. 1969):421-30.

____________ "The Concentration Profits Relationship in Antitrust." in Harvey Goldschmidt et al. eds. Industrial Concentration: The New Learning, Boston: Little Brown and Co., 1974:L 184-223.