To the Graduate Council:

I am submitting herewith a dissertation written by Mark Matthew Higgins, entitled "An Empirical Analysis of the Relationship Between Corporate Effective Tax Rates and Book Effective Tax Rates with an Analysis of the Financial Characteristics That Influence Corporate Effective Tax Rates." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Business Administration.

C. Douglass Izard

C. Douglass Izard
Major Professor

We have read this dissertation
and recommend its acceptance:

Kenneth C. Anderson

Jan R. Williams

Ralph A. O'Brien

Accepted for the Council:

Lew Minkel

Vice Provost
and Dean of the Graduate
School

AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN CORPORATE EFFECTIVE TAX RATES AND BOOK EFFECTIVE TAX RATES WITH AN ANALYSIS OF THE FINANCIAL CHARACTERISTICS THAT INFLUENCE CORPORATE EFFECTIVE TAX RATES

A Dissertation

Presented for the

Doctor of Philosophy

Degree

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Mark Matthew Higgins

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This dissertation is dedicated to my wife, Ann, whose love, patience, and constant encouragement has made what was once a dream, a reality.

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ABSTRACT

Throughout the 1970's and 1980's Congress has used the tax code as a conduit for social and economic policy. By using the tax code in this manner, corporations engaged in certain industries or large corporations who have the resources to lobby Congress might have benefited through lower effective tax rates (ETR's). In examining these issues, a longitudinal approach is used to measure a corporation's ETR. A corporation's ETR is calculated using a weighted average approach over a 14-year period . Specifically, a corporation's ETR is calculated by summing its current tax liability (CTL) over the 14-year period and dividing by its aggregate net income (ANI) for the same period.

In conjunction with examining corporate ETR's, the study investigates whether deferred taxes, in the aggregate, reverse over time. The study investigates this question by comparing the difference between a corporation's effective tax rate (ETR) and its book effective tax rate (BETR). The difference between these two variables is referred to as a corporation's book tax difference (BTD). If deferred taxes reverse over time then BTD should equal zero. The study also examines whether BTD's are consistent across industry and firm size.

Data were collected from 1,095 firms on the COMPUSTAT 1987 tapes for the period 1973 to 1986. The data set represents the population of firms having all 14 years of data and SIC Codes between 1000 and 5999. To test whether industry or size had an impact on ETR or BTD seven measures of central tendency were employed. The seven measures were: an unweighted average, weighted average, unweighted trimmed mean, weighted trimmed mean, unweighted Winsorized mean, weighted Winsorized mean, and median.

The results of the study indicate that for all measures examined, except the weighted trimmed, ETR was not equal across industry. With the exception of the unweighted measure and the median, the size of the firm does not effect ETR. The study also found that deferred taxes, in the aggregate, do not reverse over time. The results also indicate that BTD's are not consistent across industry and that for the unweighted, weighted, and median measures of central tendency size has an impact on BTD's.

The study concludes that large firms and certain industries (e.g., SIC 4000-4999) have benefited more than other industries and small firms from the economic incentives provided in the tax code. The study found that from a financial accounting perspective, the comprehensive method of accounting for deferred income taxes has created a liability on the balance sheet that represents a permanent not temporary difference. Finally, the book

effective tax rate set forth in the footnotes to the financial statements does not provide useful cash-flow information to investors or creditors.

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CHAPTER 1

INTRODUCTION

BACKGROUND

From the passage of the Internal Revenue Code of 1954 through the Tax Reform Act of 1976 (TRA76), Congress had followed a methodical approach in using the federal tax system as a vehicle for economic policy. Congress' approach to tax reform was to enact legislation (e.g., the investment tax credit in 1962), monitor the legislations' impact on the economy, and then decide whether the legislation should be continued or repealed.[1] Thus, from the adoption of the 1954 Code until 1976, changes to the tax code were made every seven or eight years. However, beginning with the Revenue Act of 1978 (RA78), through the passage of the Tax Reform Act of 1986 (TRA86), Congress approved five major tax bills in nine years. Incredibly, Congress, on average, passed a major piece of tax legislation every 22 months.

The Revenue Act of 1978, set the precedent for using the tax system as a short-term mechanism for adjusting economic policy. In addition, since RA78 came just two years after the Tax Reform Act of 1976, the act broke

1. In fact, the investment tax credit was repealed in 1969.

Congress' long observed approach of legislating and monitoring. Despite the bills name, RA78 was not a revenue raiser but rather, a revenue reducer. This legislation reduced tax revenues by $19 billion. The primary goal of RA78 was to help stimulate the economy and avoid a potential recession. The key corporate provisions to facilitate this goal were: (1) reduce the top corporate tax rate from 48% to 46%, (2) permanently establish the investment tax credit, (3) liberalize the work incentive program (WIN) credit, and (4) liberalize the accumulated earnings tax provision. Unfortunately, these provisions failed to achieve their desired results.

Upon entering office in 1981, President Reagan and his administration continued the precedent established in 1978 of using the tax system as a tool of economic policy. With the aid of a Senate majority and a "mandate" from the voters, the President convinced Congress to pass the Economic Recovery Tax Act of 1981 (ERTA). ERTA's primary objective was to spur the U.S. economy out of the recession of 1980. In achieving this objective, ERTA represented the largest tax cut in U.S. history. Discussing ERTA, DeStafano [1982, p. 52-54] states:

> This Act is a significant component of the President's overall economic policy program which is geared toward creating incentives for savings, investments, and individual initiative.

A few of ERTA's key provisions specifically designed to ensure economic recovery were: (1) the accelerated cost recovery system (ACRS), (2) safe harbor leasing, and (3) research development tax credits.

Ironically, one year later, as a result of the tax incentives provided by ERTA, the United States was faced with a massive budget deficit. In an effort to halt the growing budget deficit, the Reagan administration helped guide through Congress the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA). Levy [1982, p. 74] wrote:

> In what is developing into an annual affair, Congress has once again amended our tax laws. TEFRA is a complex piece of legislation that cuts across numerous Internal Revenue Code provisions.

Raby [1982, p. 64] in discussing TEFRA states:

> [It is] not really a tax cut but a "revision" to correct inequities, close loopholes and put more pressure on the taxpayer to ante up more of the government's share, TEFRA really has delivered what it has promised. And this has prompted critics to call it the "wayward son of ERTA," "a nightmare for small business" and "a spur to unstable economic policy."

TEFRA became the largest revenue raising legislation ever passed by Congress. Estimated to raise over $100 billion of revenue, TEFRA's primary goals were to increase taxpayer compliance and scaleback the generous provisions of ERTA. TEFRA achieved these goals by instituting numerous penalty provisions (e.g., substantial understatement of tax liability, promoting abusive tax

shelters), repealing the safe harbor leasing provisions of ERTA, and increasing the useful life of ACRS assets.

In 1984, after a one year absence of tax legislation, Congress passed the third major tax act of the decade, the Deficit Reduction Act of 1984 (DEFRA). This legislation represented the second largest tax increase in the history of the United States and was designed to generate over $50 dollars in tax revenue from fiscal years 1985 to 1987. The goal of DEFRA was to reduce the federal deficit by repealing or postponing many of the tax reduction measures previously enacted in ERTA. Some of the specific provisions which affected corporations were: (1) a further increase in the useful life of assets under ACRS, (2) greater restrictions on the use of the installment sales method and (3) a restriction on the type of bonds which qualify as industrial development bonds (IDB's). In addition, DEFRA placed even greater demands than TEFRA on tax compliance. Liebtag [1984, p. 51] in discussing DEFRA states:

> It is the first tax act to be specifically driven by federal budget considerations. ... The act may be considered a successor to TEFRA, which placed many restrictions on its predecessor, ERTA. DEFRA must be viewed as a predecessor to tax reform measures anticipated in 1985 and 1986.

As is evident by the above quote, as soon as Congress passed DEFRA, the need for another tax bill, a bill that

would reduce the complexities that the passage of three bills in four years had created, was apparent.

The Reagan administration's final major piece of tax legislation was the Tax Reform Act of 1986 (TRA86). Although this legislation resulted in sweeping changes in the structure of the tax system, this act was designed to be revenue neutral. The dual objectives of the legislation were to reduce the complexity in the tax system and make the system equitable. Roscoe Egger, former Commissioner of the Internal Revenue, states:

> This new law reflects the chief objective of its framers: Those with similar incomes should pay essentially the same amount of taxes. This injects an element of fairness into the system that has been absent from prior tax laws. At the same time, the new law reflects a sharp departure from the recent trend toward attempting to cure a wide variety of social and economic problems through tax incentives, or perhaps more accurately tax subsidies. [Price Waterhouse 1986 p. vii]

As a result of TRA86, the top corporate tax rate was reduced from 46% to 34% (or 39% for taxable income between $100,000 and $335,000). However, to counterbalance the loss in revenues, many of the corporate deductions previously allowed were scaled back or repealed. For example: (1) the ACRS provisions first adopted in 1981 and scaledback in 1982 and 1984 were revised (i.e., Modified Accelerated Cost Recovery System - MACRS), (2) the investment tax credit was repealed, and (3) additional

restrictions were placed on the use of the installment sales method.

In summary, since 1976 Congress has used the tax code as a conduit for social and economic policy. Further, the social and economic objectives espoused by Congress have vacillated from year to year. A possible problem with this vacillation is that corporations engaged in certain trades or businesses have benefited by having lower effective tax rates. Therefore, it is not surprising that studies which have examined effective corporate tax rates on a yearly basis have produced conflicting results and dramatic industry swings (Tax Notes [1982a], Tax Notes [1982b], McIntyre [1985]). In addition to the volume of tax legislation passed during the Reagan presidency, four methodological problems have contributed to the conflicting results: (1) the studies have failed to use the same sample of firms, (2) the studies have failed to use the same definition of federal taxes paid or aggregate net income in calculating a corporation's effective tax rate (ETR), (3) the studies have only examined corporations on a year-by-year basis rather than longitudinally, and (4) the studies have examined only large Fortune 500 corporations.

STATEMENT OF THE PROBLEM

A corporation's ETR is defined as the ratio of taxes to a standard. The standards commonly used are book income before tax (Siegfried [1976], Porcano [1986]), and cash flow [Zimmerman, 1983]. When employing financial statements as a data source, three different approaches exist for measuring a corporation's tax component: the comprehensive approach (i.e., current tax liability plus deferred taxes), the partial approach (i.e., current tax liability plus a portion of the deferred taxes), and the current payable approach (i.e., current tax liability). The sole difference between these approaches is the treatment of deferred taxes. Clowery et al. [1985] point out that inferences made concerning corporate income tax burdens differ depending on the method used to calculate the corporation's tax component.

Deferred taxes are the result of temporary differences between accounting income as defined by the Financial Accounting Standards Board (FASB) and taxable income as defined in the Internal Revenue Code (IRC). The pronouncements and technical bulletins set forth by the FASB determine a corporation's accounting income. These rules are commonly referred to as generally accepted accounting principles (GAAP). Two of the fundamental concepts underlying GAAP are the matching principle and

the revenue recognition principle. Williams et al. [1987, pp. 49-50] describe the matching principle as follows:

> The matching principle dictates that costs should be recognized as expenses when the goods or services represented by the costs contribute to revenue. In other words, accountants should attempt to associate (match) the revenues of a given accounting period with all the expenses that were incurred to generate those revenues.

Williams et al. [1987, p. 48] explain the revenue recognition principle as follows:

> The principle states that revenue should be recognized (recorded) when (1) the earning process is complete or virtually complete, and (2) an exchange transaction has taken place.

The matching principle, coupled with the revenue recognition principle, form the cornerstone of the accrual method of financial accounting.

The IRC requires that a corporation's taxable income be determined on the basis of completed transactions between the taxpayer and a third party [Raby, 1975]. Specifically, Section 446 of the IRC requires "that taxable income shall be computed under the method of accounting on the basis of which the taxpayer regularly computes his income in keeping his books." Although both accounting income and taxable income appear to be computed in a similar fashion, striking differences exist. For example, the accrual method used in determining taxable income has a more stringent requirement of when revenues and expenses become fixed and determinable than under

accounting rules.[2] As a result, accounting income differs from taxable income, with these differences being temporary or non-taxable.

Temporary differences consist of revenues or expenses which are included/excluded in calculating accounting income during one period but are included/excluded in deriving taxable income in a different period. Figure 1 sets forth and describes the most commonly found temporary differences [Clowery et al., 1985]. A non-taxable event is a transaction that has no tax consequences. For example, a revenue event that has no tax consequences is interest on municipal bonds, and an expense that does not have tax consequences (i.e., provides a tax benefit) is life insurance premiums on corporate officers.

As a result of the temporary differences between a corporation's accounting income and taxable income a difference exists between a corporation's accounting tax expense and federal tax liability. The question of whether the tax effects of short-term and long-term temporary differences should be considered as deferred liabilities has been the focus of sharp debate.

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2. See Regulation 1.446-1 for a detailed explanation of these rules.

(1) **Depreciation:** The useful life of the asset for book purposes is greater than the useful life for tax purposes. The difference in the useful of an asset is usually the result of the depreciation method employed.

(2) **Intangible Drilling Costs:** For accounting purposes these expenses are capitalized; for tax purposes these expenses are deductible.

(3) **Pensions:** The amount accrued as an expense on the financial statements is not equal to the amount funded. Only the amount funded is deductible for tax purposes.

(4) **Capitalized Interest:** For accounting purposes the interest cost of assets that are constructed must be capitalized and thus deducted over the useful life of the asset. For tax purposes only 10% of the interest cost is deductible each year.

(5) **Installment Sales:** Financial accounting requires that the installment method be used only when future payments are not reasonably certain. Tax law allows the installment method to be used when at least one future payment is to be received after the end of the taxable year.

(6) **Investment Tax Credit:** For financial purposes the flow-through (i.e., the tax credit is deducted in the year of purchase) or the deferred method (i.e., the tax credit is deducted over the useful life of the asset) is permitted. For tax purposes, the flow through method is used.

(7) **Domestic International Sales Corporation:** The tax law allowed corporations, who had elected to be treated as a DISC, to exclude 50% of earnings attributable to the DISC.

(8) Unremitted Equity Earnings: Financial accounting includes undistributed earnings of subsidiaries except when it can be shown that these earnings will be re-invested indefinitely. For tax purposes the earnings are taxable only upon remittance.

Figure 1. Frequently mentioned temporary differences. Source: Clowery et al., [1985].

Commenting on this issue, Mark Starcher in Tax Notes [1982a, p. 18] states:

> By far the most common objection to Tax Notes' effective tax rate computation is that Tax Notes refuses to treat some "deferred taxes" as taxes actually paid.

Horst [1982, p. 348] commenting on the failure of researchers to use deferred taxes in effective tax rate studies states:

> The conclusion that "quasi permanent" deferred taxes (i.e., depreciation) should be ignored on the theory that they will in all probability be "rolled over" is wrong.

Therefore, the challenge of this study is to find a methodology which addresses the criticisms discussed by Starcher and Horst, yet properly reflects a corporation's tax burden.

In conjunction with examining corporate tax burdens, two related issues should be explored. The first is whether corporate effective tax rates are progressive, regressive, or proportional relative to a given financial characteristic [Zimmerman 1983, Porcano 1986]. Fullerton [1984 pp. 580-581] commenting on the usefulness of effective tax rates states:

> The corporate tax system imposes different rates of tax on different industries, or different assets or more generally, on different activities. There [is] too much investment in some assets and therefore too little in others. Some industries use a higher proportion of tax favored assets than other industries, so investment is misallocated by industries as well.

Fullerton implies that there are certain corporate and financial characteristics which influence a corporation's effective tax rate, and to properly examine effective tax rates, these characteristics should be empirically examined.

The second issue is whether corporate and/or financial characteristics are useful in predicting a corporation's tax liability [Stickney and McGee, 1982]. The FASB in Statement of Financial Accounting Concepts (SFAC) No. 1 states:

> Financial reporting should provide information about an enterprise's financial performance during a period. Investors and creditors often use information about the past to help in assessing the prospects of an enterprise. [FASB November, 1978 par. 42]

Therefore, the construction of a model which can predict a corporation's tax liability would be extremely beneficial to investors and creditors.

A financial question in which effective tax rate analysis could provide insight is whether deferred taxes, in the aggregate, accurately reflect a future corporate liability. Commenting on this issue, the National Director of Accounting for Seidman and Seidman, stated: "The deferred taxes on the balance sheet bear no relationship to what is actually going to be paid" [Carmichael 1981, p. 15]. Accountants agree that individual temporary differences reverse over time, but they have not conducted a study as to whether, over time,

a corporation's book effective tax rate (i.e., current tax liability plus deferred taxes) provides useful information.

MOTIVATION FOR THE STUDY

Prior studies investigating the issue of effective tax rates have suffered from methodological limitations. Spooner [1986] summarizes the problems associated with using financial statement data to calculate a corporation's effective tax rate. She found that previous studies have contained the following problems: (1) insufficient sample size; (2) point estimates instead of trends; (3) misclassifying companies within an industry; (4) failing to include state taxes, foreign taxes, and property taxes as part of total taxes; (5) improper matching of tax expense with book income; and (6) separating U.S. and foreign taxes. Therefore, the primary objective of this study is to (1) provide a method for calculating a corporation's effective tax rate that accurately reflects a corporation's effective tax rate and (2) test whether this method indicates that corporate tax burdens are affected by industry or size.

In conjunction with the study of corporate tax burdens, two other issues should be investigated. The first is whether the corporate tax system is regressive, proportional, or progressive. Specifically, for a given

corporate or financial characteristic (e.g., total sales) does the corporate effective tax rate vary across levels of the characteristic being examined?

Both Zimmerman [1983] and Porcano [1986] investigated this question by classifying firms into different size categories (i.e., small to large). Although both used the same methodology, their results were inconsistent. Zimmerman found that ETR is higher for large corporations than small corporations and the relationship between size and ETR is not monotonically distributed. Meanwhile, Porcano found that ETR is lower for large firms and that the relationship between size and ETR is monotonically distributed. Thus, the second objective of the study is (1) determine whether ETR is higher for large or small firms and (2) for a given financial characteristic are effective tax rates regressive, proportional, or progressive.

Another question that can be examined is whether corporate and/or financial characteristics can be used to predict a corporation's tax liability. Stickney [1979, p. 53] states: "the ability to predict a firm's future effective tax rate can significantly improve predictions of its cash flow and earnings." Although Stickney and McGee [1982] examined the effect corporate and financial characteristics have on ETR, their research design did not allow them to predict a corporation's tax liability.

Thus, the third objective of the study is to ascertain whether corporate and financial characteristics can be used to predict a corporation's tax liability.

The final objective of the study is to investigate the relationship between a corporation's effective tax rate (ETR) using the current payable approach and a corporation's book effective tax rate (i.e., the effective tax rate disclosed in a corporation's financial statements). By examining these two rates, a conclusion can be reached as to whether or not deferred taxes reverse over time. If deferred taxes reverse over time, a corporation's book effective tax rate (BETR) should approximate its ETR.

METHODOLOGY

A crucial aspect of this study is the development of a method which calculates a corporation's effective tax rate (ETR) and overcomes the methodological limitations of prior studies. The main methodological limitation found in prior studies was the inability of the researcher to properly match a corporation's tax liability with its aggregate income. To correct this problem, the study uses a 14-year weighted average approach to match a corporation's current tax liability with its aggregate income. A 14-year time frame was used because prior to 1973 the Securities Exchange Commission (SEC) did not

require a corporation to disclose deferred tax information in its 10-K.[3] Therefore, 14 years represents the longest time frame available to accurately analyze a corporation's effective tax rate.

Another methodological limitation of prior ETR studies was their failure to include the effect of dispositions and extraordinary items in the definition of income. By not including gains or losses from dispositions or extraordinary items in their definition of net income, previous studies have either overstated or understated a corporation's effective tax rate. Therefore, an effective tax rate that properly matches a corporation's aggregate income with its taxes paid should provide an accurate portrayal of its tax burden.

CONTRIBUTIONS AND LIMITATIONS

The study makes four contributions to the tax literature. First, it uses a 14-year weighted average effective tax rate to determine a corporation's tax burden. Since this method properly matches a corporation's income with its actual taxes paid, it allows

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3. Accounting Series Release #149, which required companies to provide additional information concerning a corporation's deferred taxes became effective for all companies whose accounting year ended after December 15, 1973.

tax policy experts to draw valid conclusions concerning corporate tax burdens.

Second, it examines the relationship between a corporation's effective tax rate (ETR) calculated under the current payable approach and its book effective tax rate (BETR). The comparison of ETR and BETR should provide valuable insights concerning the relationship between these two measures. For example, if ETR is consistently smaller than BETR, then the rationale for disclosing BETR as opposed to ETR would have to be questioned.

Third, this study examines whether financial and/or corporate characteristics can assist investors and creditors in predicting a corporation's future taxes payable. This information would be important in helping investors and creditors assess a corporation's future cash flow.

Fourth, it presents a detailed examination of corporate effective tax rates by examining the population of corporations listed on the COMPUSTAT [1967-1986] tape with an industry classification between 1000 and 5999. Prior studies have examined only large corporations.

The first limitation of the study is that a 14-year time horizon does not represent a full tax cycle. For tax purposes prior to 1981, the "accelerated" useful life of assets ranged from three to twenty years. However,

between January 1, 1981 and March 16, 1984 the "accelerated" useful life ranged from three to fifteen years and from March 16, 1984 until the end of 1986 the "accelerated" useful life ranged from three to nineteen years. For example, if a corporation acquired a building in 1973, the depreciation temporary difference associated with it would not fully reverse until twenty years later in 1992. Therefore, the ideal time frame would have been twenty years (i.e., 1967 to 1986). However, because the information needed in this study was not required by the SEC until 1973, a twenty-year time horizon was not possible. Thus, the inability to investigate ETR and BETR over a twenty-year period is the study's primary limitation.

The study's second limitation is that the companies which comprise a corporation's consolidated financial statements are not always the same companies which comprise the corporation's consolidated tax return. Therefore, the current tax burden disclosed in the financial statements might not coincide with the corporation's actual tax burden.[4]

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4. This should not be a problem in the future because of FASB pronouncement No. 94 Consolidation of All Majority-Owned Subsidiaries. Statement No. 94 now requires that corporations filing consolidated financial statements include "nonhomogenous" operations. Previously corporations could exclude "nonhomogenous" operations. An example of this practice was the exclusion of Allstate Insurance from the Sears consolidated financial statements.

ORGANIZATION OF THE STUDY

The study consists of six chapters. The first chapter is the introduction. This chapter provides the reader with a brief synopsis of recent tax legislation which could impact corporate effective tax rates, the research questions being investigated, the motivation for the study, a brief description of the study's methodology, and the contributions and limitations of the study.

The second chapter sets forth the three methods (i.e., comprehensive approach, partial approach and the current payable approach) of calculating a corporation's effective tax rate. This chapter also describes the three methods of accounting for deferred taxes (i.e., comprehensive, partial and flow-through) and discusses the strengths and weaknesses of each method.

Chapter 3, the literature review, presents the theoretical foundation for exploring the research question, along with providing the support for the methodological framework used in the study. This chapter is divided into two sections. The first section reviews studies the effective tax rate literature. The second section summarizes several studies that have explored the impact of the Internal Revenue Code on different industries or corporations that possess certain financial

traits (e.g., a high debt-to-equity ratio and foreign operations).

Chapter 4 sets forth the study's methodology and describes how the data were collected. Further, the chapter describes the four phases of the study. Specifically, for each phase of the study, the chapter discusses the research design, the independent and dependent variables, and the methods used to analyze the data.

The fifth chapter presents the results of the study's four phases. In addition, the chapter discusses the tax policy and financial accounting implications of the results.

The final chapter, 6, summarizes the conclusions of the research study while setting forth the study's contributions and limitations. The chapter also discusses possible areas for future research.

CHAPTER 2

EFFECTIVE TAX RATE AND DEFERRED TAX METHODS

INTRODUCTION

Chapter two consists of two parts. The first part discusses the three approaches used in calculating a corporation's effective tax rate: the comprehensive approach, the partial approach, and the current payable approach. The second part of this chapter discusses the three methods (i.e., the comprehensive, partial and flow-through) used to account for deferred taxes. The second part of the chapter begins by providing some background information concerning the issue of deferred taxes and then sets forth the advantages and the disadvantages of employing each method.

EFFECTIVE TAX RATE METHODS

Comprehensive Approach

The comprehensive approach calculates a corporation's effective tax rate (ETR) by including as taxes paid a company's current tax liability and all future taxes payable (i.e., current and deferred taxes). Previous research has used either a corporation's cash flow from operations or book income from operations as the denominator of the ETR calculation [Zimmerman, 1983;

Porcano, 1986]. Advocates of this method contend that a corporation's tax burden must include both a corporation's current tax liability plus any future tax liability (i.e., deferred taxes). Advocates believe that while deferred taxes maybe postponed for many years, nevertheless deferred taxes do represent future cash outlays. Supporting this notion, Beresford et al. [1983, p. 23] commenting on the comprehensive method of accounting for deferred taxes, state: "except in the case of war or other national distress, tax rates and tax laws are not likely to change to the extent that any current estimates are useless."[5] However, opponents of this methodology are quick to point out that neither of the dramatic events mentioned by Beresford can be cited as the reason why, in 1986, Congress reduced the top statutory corporate tax rate from 46% to 34%, a reduction of more than 25%.[6] Therefore, to the extent Congress has changed the tax laws based on ETR studies using the comprehensive approach they have erred, since a corporation's ETR would have included taxes that will never be paid.

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5. The comprehensive method of accounting for deferred taxes is analogous to the comprehensive approach of calculating a corporation's effective tax rate.

6. The 34% tax rate is phased in over a two-year period.

Partial Approach

The partial approach calculates a corporation's effective tax rate based on a company's current taxes payable plus the amount of deferred taxes likely to reverse in the near future. As with the comprehensive approach, the denominator of the ETR calculation is either cash flow from operations or book income [Zimmerman, 1983; Porcano, 1986]. Starcher [1981, p. 20], disagreeing with the partial approach methodology used in the Tax Notes studies [1982a and 1982b] points out that:

> The interest free loan aspect of the deferred tax provision are not disclosed; thus, [this] method overstates a corporation's true tax liability for a given year and understates the financial net income and stockholder equity accounts.

The purpose of analyzing corporate effective tax rates is to determine a corporation's current tax burden. Therefore, by including short-term deferred taxes in the numerator of the ETR calculation the partial approach, overstates the corporation's effective tax rate and provides inaccurate information that can affect future tax policy.

Current Payable Approach

The current payable approach calculates a corporation's effective tax rate by dividing a corporation's current tax liability by the corporation's

book income from operations or cash flow from operations. The problem with this approach, as Fullerton [1984] points out, is that it mixes two approaches. The numerator is taxes paid on earnings from investments made in one year minus the credits on investments from other years while the denominator can be affected by temporarily high profits or losses in one year. In other words, examining a corporation's yearly ETR using this approach can produce distorted and misleading results. Therefore, this approach should only be used when examining corporations longitudinally.

DEFERRED TAX METHODS

Background

In 1966, the Accounting Research Division of the American Institute of Certified Public Accountants (AICPA), responding to a request made a year earlier by the Accounting Principles Board (APB), issued Accounting Research Study (ARS) No. 9, Interperiod Allocation of Corporate Income Taxes. ASR No. 9 was founded on two premises:

> (1) Income taxes are expenses rather than distributions of income, and
>
> (2) Income taxes should be allocated to applicable periods, and the disclosure of timing differences in a note to the financial statements is an unacceptable substitute to presenting them in the financial statements.

These two premises formed the basis of APB Opinion No. 11, Accounting for Income Taxes.

The APB, in Opinion No. 11, selected the comprehensive method of interperiod tax allocation to account for differences between book and taxable income.[7] This method requires that a corporation present the following information in its financial statements:

> (1) The income statement must include the current year's tax expense.
>
> (2) The current liabilities section of the balance sheet must reflect the current year's taxes payable.
>
> (3) The balance sheet must include deferred tax debit and/or credit accounts to reflect the tax effects of the accumulated differences between the income tax expense and the amount of taxes payable.

Although APB No. 11 resolved some of the controversy over how to account for deferred taxes, critics still questioned whether the method advocated in Opinion No. 11 was theoretically and practically sound.

Throughout the 1970's and early 1980's, as Congress continued to change the tax laws, the number of differences between taxable income and book income continued to grow. This constant change in the tax laws further increased the complexity of calculating deferred taxes. In addition, with the issuance of Statement of Financial Accounting Concepts (SFAC) No. 3, the rationale

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7. Within the comprehensive method exists three approaches: the deferred, the liability, and net of tax. APB No. 11 advocated the deferred approach.

for APB No. 11 was now in conflict with the SFAC's definition of a liability. SFAC No. 3 defines a liability as:

> Probable future sacrifices of economic benefits arising from present obligations of a particular entity to transfer assets or provide services to other entities in the future as a result of past transactions or events. (FASB, December 1980, par. 28).

As a result, the FASB was under constant pressure from corporations and accounting practitioners to re-examine the issue of deferred taxes. The result of the FASB's examination was Accounting for Income Taxes: A Review of Alternatives. Issued in July of 1983, this research report provided a detailed analysis of the alternative methods for treating deferred taxes and would serve as a foundation for the FASB replacing APB No. 11 with Statement No. 96, Accounting for Income Taxes [FASB, December 1987].

Alternative Methods

The adoption of Statement No. 96 represented the culmination of six years of effort by the FASB to create a theoretically sound and yet practical approach to account for differences between taxable income and book income. Over these six years, the FASB solicited the guidance of the accounting profession and held public discussions exploring various alternatives. As a result of this discourse, the FASB decided to retain the comprehensive

method of interperiod tax allocation but use the liability approach, instead of the deferred approach as advocated in APB No. 11. Before deciding on this approach, the Board strongly considered two other methods of accounting for deferred taxes: the partial allocation method and the flow-through method.

Partial Allocation

Advocates of the partial allocation method believe that only current taxes payable and deferred taxes that reverse in the near future should be recognized in the balance sheet of the financial statements. Supporters of partial allocation received international backing in 1978 when the Accounting Standards Committee of the Institute of Chartered Accountants of England and Whales (ICAEW) adopted Statement of Standard Accounting Practice (SSAP) No. 15, Accounting for Deferred Taxation. Under SSAP No. 15, only deferred taxes which are expected to reverse within the next three years plus the current year's taxes payable should be included in the corporation's balance sheet.

Opponents argue that the partial allocation method assumes both management and auditors are able to forecast and agree upon when a temporary difference reverses. Another criticism of this method is it fails to include all probable future sacrifices (i.e., long-term deferred

taxes). In doing so, this method conflicts with the definition of a liability in Statement of Financial Accounting Concepts (SFAC) No. 3.

Flow-Through Method

The flow-through method of accounting for income taxes eliminates deferred taxes by equating the tax expense on the income statement with the tax liability on the balance sheet. Thus, a corporation's tax expense and tax liability are jointly determined by multiplying a corporation's taxable income by the current tax rate. The flow-through method has received support in recent years because of the increasing difficulty corporations have faced in calculating deferred taxes. Proponents of the flow-through method argue that corporate taxes are the result of the fiscal and economic goals of the government and, therefore, the tax expense should be based on taxable income not financial income. They further contend that interperiod tax allocation contributes to income smoothing and, thus, net income is artificial and its predictive ability is useless.

Supporters of the flow-through method cite two conceptual problems with interperiod tax allocation (i.e., comprehensive approach and the partial allocation approach). First, they contend that interperiod tax allocation may overstate the liability section of the

balance sheet. Supporting this notion, a 1981 study of annual reports of the top 250 industrial companies indicated that more than 10% of the companies reported credit balances in their deferred tax accounts, ranging from 20% to 39% of stockholders' equity. A decade earlier this ratio was just 7% [Beresford, 1982]. Thus, critics argue that companies experiencing stable or increased growth have balances in their deferred tax accounts that may never reverse.

Second, users of financial statements when making credit and investment decisions find the balances in the deferred tax accounts of minimal value. In SFAC No. 1, the FASB states:

> Financial reporting should provide information that is useful to present and potential investors and creditors and other users in making rational investment, credit, and similar decisions. (FASB, November 1978, par. 34)

The issue of whether information provided in financial statements is useful to creditors and investors has been the focus of many studies. Stanga and Tiller [1983] examined the information needs of loan officers at small and large banks. They asked loan officers to rank on a scale of 0 to 4, with 0 representing "not important" and 4 representing "extremely important," 40 specific items of accounting information. The study concluded that, on average, loan officers at large banks ranked deferred

taxes the twenty-third most important item, while loan officers at smaller banks ranked it twenty-first.

Chandra [1974] asked accountants and security analysts to rate 58 financial information items according to the value they provided in making investment decisions. They were asked to rate the value of the items on a scale of 1 to 5, with 1 signifying "very unimportant" and 5 signifying "important." The results indicated that, on average, accountants rated the value of knowing the balance in the deferred tax liability or prepaid asset account as the twenty-first most important item, and security analysts ranked the value of this information twenty-fifth.

These studies provide evidence that the usefulness of deferred taxes is questionable. Accordingly, this raises the question of whether the substantial costs associated with providing deferred tax information should be re-allocated to areas which might better benefit both management and users of financial reports.

A possible explanation for why corporations have not supported the flow-through method is the impact the method would have on a corporation's ability to establish tax "cushions." A corporation that takes an aggressive position concerning the tax treatment of a transaction often "cushions" this aggressiveness in the financial statements by reporting a portion of the potential tax

liability in current taxes payable. If the flow-through method were enacted, corporations would have difficulty "cushioning" a transaction because any difference between the current taxes payable on the financial statements and the actual taxes paid on the corporate tax return would signal the IRS that a questionable position was taken on the corporation's tax return.[8] Nevertheless, the question of why publicly-held corporations are uninterested in the implementation of the flow-through method remains unresolved despite the fact this method would substantially reduce the administrative expenses associated with deferred taxes. As with the comprehensive and partial method, the flow-through method has also been subjected to extensive criticism.

Critics of the flow-through method cite the following weaknesses. First, it causes the liabilities in the balance sheet to be understated. As with the partial allocation method, the failure of the flow-through method to properly account for all probable liabilities conflicts with the definition of a liability as described in SFAC No.3.

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8. This is not to imply that a corporation omits the payment of taxes on certain transactions but rather, the corporation believes that the tax position advocated by the IRS with regard to this transactions is in error. A corporation typically arrives at this conclusion only after extensive research. In addition, the position taken by the corporation must be based on substantial authoritative support.

Second, critics contend that the flow-through method causes a corporation's earnings to fluctuate from year to year. For example, in early years a company with net tax-favored temporary differences would report a higher net income than under the comprehensive method. However, in later years, when these temporary differences reverse, the company will be in a non-tax favored position and report a lower net income. Beresford et al. [1984, p. 22] in defending the use of interperiod tax allocation against proponents of the flow-through method state:

> Interperiod tax allocation makes income a better measure of earnings power and it avoids periodic income distortions resulting from the tax rules. The flow-through method results in fluctuations in reported earnings that are unrelated to earnings potential-rather, such fluctuations result only from differences in the timing of income and expense recognition for financial reporting and tax purposes.

The following example illustrates this point.

	YEAR 1	YEAR 5
Book Income	$200,000	$200,000
Net Temporary Differences (Tax Favored)	(100,000)	100,000
Taxable Income	$100,000	$300,000
Tax Rate	35%	35%
Tax Expense:		
Comprehensive Method	$ 70,000	$ 70,000
Flow-Through Method	$ 35,000	$105,000

The third problem with the flow-through method is that it makes intercompany comparisons difficult. This can be illustrated by modifying the previous example.

	COMPANY A	COMPANY B
Book Income	$200,000	$200,000
Net Temporary Differences (Tax Favored)	(100,000)	100,000
Taxable Income	$100,000	$300,000
Tax Rate	35%	35%
Tax Expense:		
Comprehensive Method	$ 70,000	$ 70,000
Flow-Through Method	$ 35,000	$105,000

The above examples clearly demonstrate the difficulty users of financial statements can have in comparing either two different companies or the same company over time [Beresford et al., 1984]. The inability of users to compare the financial statements of two corporations is contrary to the position advocated by the FASB stated in SFAC No. 2:

> Information about an enterprise gains greatly in usefulness if it can be compared with similar information about other enterprises and with similar information about the same enterprise from one period or some other point in time. [FASB, May 1980, par. 111]

Statement No. 96

After the FASB decided not to use either the partial allocation method or the flow-through method, the Board was still faced with the critical decision of which approach (i.e., net of tax, deferred, or liability) within the comprehensive method should be used.

The first alternative the Board examined was the net of tax method. With this approach, either the deferred

method or the liability method is used in calculating the deferred debits or credits. However, the tax effects of temporary differences are not classified as prepaid assets or deferred liabilities. Instead, they are netted against the assets or liabilities which created them. For example, if the tax depreciation on a piece of equipment is greater than the book depreciation, the resulting deferred credit would offset the book value of the asset in the same manner as accumulated depreciation. In fact, the deferred credit would be a component of accumulated depreciation. Thus, under this method, assets are valued net of the applicable deferred tax.

The second alternative the Board examined was whether to continue using the deferred method. In 1967 when APB No. 11 was adopted, accounting theorists advocated a revenue/expense approach. They believed that users of financial statements were primarily concerned with the information contained in the income statement. As a result, APB Opinion No. 11 emphasized the calculation of a corporation's income tax expense not the calculation of the deferred tax liability (asset).

Under this approach, the calculation of a corporation's tax expense requires that accounting income be adjusted for all permanent differences to arrive at adjusted book income. Adjusted book income is then multiplied by the statutory federal tax rate (currently

34%) to determine the corporation's tax expense. The corporation's tax liability, a balance sheet account, is computed by increasing or decreasing adjusted book income for all temporary differences to arrive at taxable income. Taxable income is then multiplied by the statutory federal tax rate to determine the corporation's tax liability. For a corporation's income statement and balance sheet to articulate, the APB created an additional balance sheet account. This account -- a deferred tax debit or credit -- was created to reflect the tax effects of the accumulated differences between a corporation's income tax expense and tax liability.

The bylaws of the APB required that for an opinion to be adopted, the measure needed the endorsement of two-thirds of the twenty-one member Board (i.e., 14 votes). In passing, APB No. 11 received just 14 votes. Therefore, it is not surprising that from its inception the opinion was the focus of considerable criticism. When the APB was superseded by the FASB in 1973, one of the FASB's principle goals was to create a conceptual framework for accounting. As a result of the adoption of the conceptual framework, along with the constant changes made to the tax code the deferred method of accounting for income taxes was no longer theoretically or practically sound.

The three principle criticisms leveled against the deferred method were: (1) the method fails to consider

changes in the tax rates; (2) the deferred method is an income statement approach, whereas the conceptual framework utilizes an asset/liability approach (i.e., emphasis on the balance sheet instead of the income statement); and (3) the method creates deferred tax assets/liabilities that are not consistent with the definition of assets and liabilities delineated in SFAC No. 3. Because of the aforementioned problems associated with the deferred method, specifically its failure to be in line with the conceptual framework, the FASB changed from the deferred method to the liability method of accounting for deferred income taxes.

The objective of Statement No. 96 is "to recognize the amount of current and deferred taxes payable or refundable at the date of the financial statements. [FASB, December 1987, par. 7] To achieve this objective, the statement sets forth the following principles:

> (1) A current or deferred tax liability or asset is recognized for the current or deferred tax consequences of all events that have been recognized in the financial statements.
>
> (2) The current or deferred tax consequences of an event are measured based on provisions of the enacted tax law to determine the amount of taxes payable or refundable currently or in future years.
>
> (3) The tax consequences of earning income or incurring losses or expenses in future years or the future enactment of a change in tax laws or rates are not anticipated for purposes of recognition and measurement of a deferred tax liability or asset. [FASB, December 1987, par. 7]

The liability method utilizes an asset/liability approach in the calculation of a corporation's income tax expense. Unlike APB No. 11, where the tax expense was the primary focus, the focal point of Statement No. 96 is the corporation's current tax liability and deferred tax asset/liability.

The FASB requires that the following procedures be used to determine a corporation's current tax payable and deferred tax liability:

> (1) Estimate the particular future years in which temporary differences will result in taxable or deductible amounts.
>
> (2) Determine the net taxable or deductible amount in each future year.
>
> (3) Deduct operating loss carryforwards for tax purposes (as permitted by tax law) from net taxable amounts as scheduled to occur in the future years included in the loss carryforward period.
>
> (4) Carry back or carry forward (as permitted or required by law) net deductible amounts occurring in particular years to offset net taxable amounts that are scheduled to occur in prior or subsequent years.
>
> (5) Calculate the amount of tax for the remaining net taxable amounts that are scheduled to occur in each future year by applying presently enacted tax rates and laws for each of those years to the type and amount of net taxable amounts scheduled for those years.
>
> (6) Deduct tax credit carryforwards for tax purposes (as permitted or required by law) from the amount of tax (calculated above) for future years that are included in the carryforward periods. (No asset is recognized for any additional amount of tax credit carryforward.)

> (7) Recognize a deferred tax liability for the remaining amount of taxes payable for future years. [FASB, December 1987, par. 17]

In essence, the seven steps are used to calculate a corporation's taxable income for the current year. From this a corporation's current tax liability and future tax liabilities (i.e., deferred taxes), if any, are determined. The result of the liability approach is that a corporation's tax expense becomes the residual of these two components. Accordingly, a corporation's income tax expense is the sum of the corporation's current tax liability plus or minus the net change during the year in the corporation's deferred tax liability or asset. [FASB, December 1987, par. 206]

The FASB also set forth a stringent definition of when a corporation can recognize a deferred tax asset. The Board stated:

> "A net deferred tax asset is recognized for the deferred tax consequences of net deductible amounts in future years only to the extent that a tax benefit could be realized (based on loss carryback provisions in the tax law) by refund of taxes paid in the current or a prior year". [FASB, December 1987, par. 39]

This stringent interpretation of what constitutes a deferred tax asset is based on the Board's belief that any other interpretation would fail to comply with the definition of an asset in SFAC No. 3.

In summary, the focus of deferred taxes has shifted to an approach which attempts to better capture a

corporation's future tax liability. Research investigating whether this approach better reflects a corporation's tax liability can only be done after the liability method has been adopted and in effect for a few years. With the required adoption date of Statement No. 96 being postponed for corporations whose fiscal years start after December 15, 1989, full adoption will not take place until 1990. Research should still be conducted into determining whether the conclusions reached by the Board were warranted. Supporting this notion, Eugene Flegm, assistant comptroller for General Motors states:

> I think the FASB has gotten in a box. Maybe they realize they didn't have to go as far as they did in trying to fix something that was never really broken. [Accounting Today, 24 October, 2 (21)]

CHAPTER 3

LITERATURE REVIEW

INTRODUCTION

The effective tax rate literature can be divided into two areas: research investigating the alternative methods of calculating a corporation's effective tax rate and research assessing the impact of the tax code on industries or corporations possessing certain financial characteristics. This chapter is divided into two sections which summarize the work in these two areas.

EFFECTIVE TAX RATE STUDIES

Siegfried [1972] calculated average effective tax rates (ETR) for 110 "minor industries" using six different methods. Each of the six effective tax methods represented the effect of a particular adjustment (i.e., investment tax credit or temporary difference) from a base effective tax rate. The base ETR was derived by dividing a corporation's income tax liability before credits by its book income before tax. The purpose of Siegfried's study was two-fold: (1) it allowed the reader to determine the appropriate method of calculating ETR and (2) it was able to isolate the revenue impact of various tax adjustments.

Siegfried [1972, p. 256] found that "the greatest impact on the tax rates is the correction for unreported profits," his term for temporary differences.[9] Additionally, he discovered that if corporations were not allowed the aforementioned temporary differences (i.e., there existed no difference between book income and taxable income), the statutory tax rate could be reduced to 31.2% before federal revenues would decrease. He also discovered that "special tax treatments do not have a uniform relative impact on all industries" [p. 258].

The major methodological problem with Siegfried's study [1972, p. 256], which he recognized, was that "the computed effective tax rates are sensitive to other years' activities because of adjustments for deficits, loss carryforwards, and advertising expensing; so the non-comparability between years is important."

Stickney [1979] used three different methods to calculate 1977 corporate effective tax rates for the 30 companies comprising the Dow Jones Industrials. First, he calculated ETR by dividing a corporation's income tax expense by book income before taxes. Second, he used income taxes currently payable in the numerator and income before taxes as the denominator. Third, he retained the

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9. The temporary differences Siegfried used were depletion, expensing dry hole costs, accelerated depreciation, expensing versus capitalizing of advertising costs, and R&D expense.

same numerator as in the second method but used estimated taxable income as the denominator. He found that for a majority of the firms examined each method yielded a substantially different effective tax rate. Therefore, the choice of method has a dramatic impact on a corporation's effective tax rate. A methodological drawback of the study was its small sample size.

Weiss [1979] worked with data from the Statistics of Income for 1974 and used a Treasury Department computer program (Corporate Tax Calculator) to calculate his effective tax rate. In this study a corporation's ETR was calculated by dividing a corporation's tax before net operating losses (NOL's) and tax credits by taxable income minus DISC dividends. The study estimated that the average 1979 corporate effective tax rate would be 30.9% and the ETR industry rate would range from a low of 20.7% to a high of 36.8%. Weiss [p. 389] concluded that the use of tax return information has two limitations: (1) the analysis must use tax depreciation and tax depletion data and (2) the analysis must use profit figures which are unadjusted for inflation. Weiss also cited the study's use of only one year's data as a limitation.

McIntyre [1985] used a form of the current payable approach in calculating corporate effective tax rates for

275 major corporations from 1981-1984.[10] McIntyre derived his ETR by dividing the current taxes paid (from The Statement of Changes in Financial Position) by corporate book income before tax (from the income statement). He found that the average corporate tax rate was 15% and ranged from (7.5%) in the airline industry to 36.2% in the tobacco industry.

McIntyre's study mitigates the problem of matching book income and tax expense found in prior studies (Siegfried [1972], Stickney [1979], and Weiss [1979]) by calculating effective tax rates over a four-year period. However, the study still has two methodological problems. First, McIntyre's sample consisted of large non-randomly selected U.S. corporations. Second, while the study used a four-year period, this time frame was not long enough to allow for a corporation to experience a tax cycle.[11]

Tax Notes [1982a and 1982b] used the partial approach to calculate the effective tax rates of Fortune 500 companies. The study employed a detailed worksheet to derive each corporation's tax liability and taxable

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10. The conclusions presented are the four-year average corporate effective tax rates.

11. A tax cycle is defined as the longest time period in which a temporary difference can reverse. For example, between January 1, 1981 and March 16, 1984 the longest possible time horizon was 15 years, since this represented the longest time period for a temporary difference to reverse.

income. The worksheet was comprised of data solicited from the corporation and information provided in the corporation's 10-K.

Although Tax Notes [1982a] did not disclose an overall industry rate their study did provided average effective tax rates on an industry-by-industry basis. The study found that corporate worldwide effective tax rates ranged from 8.5% in the utility industry to 46.7% for oil companies. Tax Notes [1982b], which disclosed an overall industry rate, found the worldwide average ETR to be 29.7% and industry rates ranging from (4.1%) for companies in the transportation classification to 53.6% for companies in the oil classification. The major methodological problem in the study is the inclusion of short-term deferred taxes in the ETR calculation. The amount of deferred taxes included was based on the judgment of Tax Notes' accounting consultants and represents the deferred taxes that the consultants estimated would reverse in the near future. However, this method results in a subjective ETR that recognizes a portion of deferred taxes as a current liability prior to the actual cash payment.

The Joint Committee on Taxation (JCT) [1984] conducted a study of effective corporate tax rates for Representatives Donald Pease and Byron Dorgan. The study employed the same methodology as McIntyre [1985] and found that the worldwide industry tax rate for the time period,

1980-1983, ranged from a low of 29.2% (1983) to a high of 34.3% (1980). This range is far different than the range presented by McIntyre, 11.8% (1982) to 16.6% (1984). However, the external validity of both studies is questionable since the corporations examined were not randomly selected.

In summary (see Figure 2), the effective tax rate literature has produced varying effective tax rates predicated on the researchers' use of deferred taxes. These studies have suffered from the following methodological problems:

(1) The samples were not randomly selected.

(2) The studies examined only one year or an insufficient number of years to allow for temporary differences to reverse.

(3) The studies examined effective tax rates for only large Fortune 500 companies.

Accordingly, this study overcomes the methodological limitations found in previous studies by:

(1) Using a 14-year weighted average approach in calculating a corporation's ETR.

(2) Examining a population of (1,095) firms over a 14-year period. The companies examined include companies from both major exchanges (i.e., New York Stock Exchange and American Stock Exchange) and corporations traded Over-the-Counter.

(3) The study includes all corporate income. Thus, income/loss from discontinued operations, extraordinary gains/losses, and income/loss from continuing operations is included in the study's definition of income.

Author	Data Source Year	Sample	ETR Approach	Purpose	Conclusions
Siegfried [1972]	SOI (1963)	110 Minor Industries	Current Payable	Isolate the revenue impact of tax breaks (e.g., depreciation).	Average ETR was 39%.[a]
Stickney [1979]	F/S (1979)	Dow Jones Industrials	All Three Methods	Determine if the method of calculating ETR has an impact.	Method of ETR has an impact.
Weiss [1979]	SOI (1974)	Selected By Treasury	Current Payable	Project 1979 ETR with 1974 data.	Average ETR was 30.9%.
Tax Notes [1982a]	F/S (1980)	Fortune 500 Companies	Partial	Determine ETR for large corporations.	Average ETR not reported. Ranged from 8.5% to 46.7%.
Tax Notes [1982b]	F/S (1981)	Fortune 500 Companies	Partial	Determine ETR for large corporations.	Average ETR was 29.7%. Ranged from (4.1) to 53.6%.
Joint Com. on Taxation [1983]	F/S (1980-1983)	217 Large Corporations	Current Payable	Prepare an ETR study for Congressman Pease and Dorgan.	Average ETR not[b] reported. Ranged from 14.7% to 40.9%.
McIntyre [1985]	F/S (1981-1984)	275 Large Corporations	Current Payable	Illustrate the injustices of the current tax system.	Average ETR was 15%. Ranged from (7.5%) to 36.2%.

SOI - Statistics Of Income (Government Tape)
F/S - Financial Statements

a - unweighted average
b - range is ETR over the period 1980 - 1983

Figure 2: Summary of effective tax rate studies

(4) The study's definition of total taxes includes federal; state and local; and foreign taxes. In addition, the applicable taxes on discontinued operations and extraordinary items are also included.

TAX POLICY STUDIES

The second area of the literature where effective tax rates have been helpful is tax policy. The following studies examine how effective tax rates, if properly interpreted, can assist Congress in making informed decisions concerning tax policy.

Salamon and Siegfried [1977] examined whether a corporation's tax avoidance rate (TAR) is impacted by corporate and/or financial characteristics. The authors defined TAR as the difference between the 1963 statutory tax rate of 52% and a corporation's effective tax rate. A corporation's effective tax rate was calculated by dividing current taxes payable to "true" accounting income.[12] The method used to calculate ETR is identical to the method employed by Siegfried [1972].

The authors hypothesized that TAR is a function of firm size (sales), industry size (number of employees), income (ratio of true accounting income plus interest to total assets), market concentration, and geographic

12. True accounting income is defined as taxable income plus the amount of income a corporation was able to exclude from taxable income because of the special provisions of the tax code.

concentration. The primary objective of the study was to determine the relationship between size and political influence, with TAR representing political influence. The study found that the larger the firm, the greater the political influence (i.e., higher TAR) and that large industries are less politically successful (i.e., low TAR). The authors results are consistent with the "free rider" hypothesis. Briefly, this hypothesis states that large industries are not able to form a cohesive organization that can influence the political process. As with Siegfried [1972], the major methodological problem of the Salamon and Siegfried [1977] study was it examined only one year of data.

Stickney and McGee [1982] empirically examined the neutrality of the corporate income tax system. The authors used cluster analysis to determine whether effective tax rates for U.S. corporations are related to corporate and/or financial characteristics. Specifically, the study examined the effect of firm size, capital intensity, foreign operations, and leverage on corporate effective tax rates. The authors calculated ETR by dividing total taxes payable by book income adjusted for temporary differences (i.e., book income plus or minus the change in deferred taxes divided by .46). Stickney and McGee found that large, highly leveraged, and heavily capitalized firms have lower effective tax rates than

companies not displaying these characteristics. Because cluster analysis does not allow a researcher to determine how each variable affects the dependent variable (i.e., ETR), the study fails to produce evidence concerning the relationship between these variables.

Zimmerman [1983] studied the effect of firm size on a corporation's effective tax rate. The author followed the same approach as Stickney and McGee [1982] in calculating ETR but used both aggregate IRS data and financial statement data to investigate the size hypothesis. The size hypothesis suggests that larger firms pay higher taxes because they are politically more sensitive than smaller firms [Watts and Zimmerman, 1986]. Zimmerman found that large corporations (i.e., the 50 largest as measured by sales or assets) have a higher effective tax rate than other firms, thereby supporting the size hypothesis. The author also found that a corporation's effective tax rate does not vary monotonically with either measure of firm size.[13]

Porcano [1986] investigated whether the U.S. corporate effective tax rate, using the current payable approach, is progressive, regressive, or proportional, given a financial characteristic (e.g., sales, total assets, capital expenditures, or debt/equity). The author

13. Zimmerman's results are consistent for both sets of data.

separately analyzed data from 1982 and 1983 financial statements. His sample consisted of 1,300 companies from 1982 and 850 companies from 1983. He conducted his analysis for each independent variable by placing the corporations into quartiles and found that the U.S. corporate income tax rate is both regressive and very low. He also found that the ETR for each quartile, except capital expenditures, was monotonically distributed.

Huelten and Robertson [1984] studied the neutrality of past tax policy by comparing the effective and marginal tax rates for high-technology (high-tech) companies versus manufacturing companies. The authors used the comprehensive approach to calculate ETR and hypothesized that high-tech firms would have a higher effective tax rate than manufacturing firms because the assets of the high-tech firms are tax favored. In confirming their hypothesis, Huelten and Robertson [p. 340] state: "High technology sectors of manufacturing would have benefited from a neutral tax policy or a move to a neutral tax policy." The conclusion of the authors is even more startling because they chose to use the comprehensive method of calculating effective tax rates, a method which overstates the corporation's current liability.

Wilke [1988] examined the effect tax preferences and net income have on effective tax rates. He examined 488 corporations from 1981 through 1984, using both Compustat

data and information from the 1986 Tax Analysts Corporate Effective Tax Rate study. The author employed the partial approach (i.e., current liability plus a portion of deferred taxes) in calculating ETR. In addition, to control for size effects, both independent variables, income and tax preferences, were divided by total assets.

Wilke [1988] found that when he compared all firms to each other the conditional probability that the firm with the smaller tax preference and higher net income would have the higher ETR was 1.00. Further, he discovered that the conditional probability of examining each of these conditions separately (i.e., low tax preference or high net income) yielded conditional probabilities of .75 and .70 respectively. Thus, he concluded that both tax preference and income are important in assessing a corporation's ETR.

In conclusion (see Figure 3), because the tax policy literature is replete with only one- and two-year studies, the conclusions reached by these studies are often conflicting or not conclusive enough to warrant changes in tax policy. By using a 14-year weighted average over a diverse group of firms, this study overcomes some of the methodological limitations found in tax policy studies. Thus, only by investigating the relationship between financial characteristics and corporate ETR over a long period of time and by using a diverse group of firms can

Author	Data Source Year	Independent	Dependent	Purpose	Conclusions
Siegfried & Salamon [1977]	SOI (1963)	Assets, Employees, Net Income, Market Con., Geographic. Con.	TAR	To determine if TAR is a function of the independent variables.	Assets, Mkt. Conc., Net Income were Significant
McGee & Stickney [1982]	F/S (1978 & 1980)	Size, Debt, Foreign Operations, Capital Intensity, Nat. Resources	A	Determine the corporate characteristics that effect ETR.	Low ETR firms are capital intense and leveraged.
Zimmerman [1983]	SOI & F/S (1947-81)	Assets, Sales	B	Determine if ETR is regressive, progressive, or proportional.	ETR is high for large firms and is not monotonically distributed.
Huelten & Robertson [1984]	NIPA (1971-80)	Industry: High Tech versus Manufacturing	C	Determine if High-Tech firms are at a tax disadvantage.	High-Tech firms are at a tax disadvantage.
Porcano [1986]	F/S (1982 & 1983)	Assets, Sales, Capital Expen., Net Income	D	Determine if ETR is regressive, progressive, or proportional.	ETR is low for large firms and is monotonically distributed.
Wilke [1988]	F/S & COMPUSTAT (1981-84)	Tax Preferences, Assets, Income	C	Determine if both tax preferences & income effect ETR.	ETR is effected by both net income & tax preferences

TAR - Tax avoidance rate (.52 - ETR)
NIPA - National Income & Product Account
F/S - Financial Statements

A - Current tax liability/Taxable income
B - Current tax liability/Book income
C - Current tax expense plus deferred taxes/Book income
D - Current U.S. taxes/Book income

Figure 3: Summary of tax policy studies

tax policy experts garner sufficient evidence to change the tax laws.

CHAPTER 4

RESEARCH METHODOLOGY AND DESIGN

INTRODUCTION

This chapter is divided into six sections. Section one describes the methodology employed in the study and the rationale for its use. The second section discusses the data source used in the study and provides an explanation of how the data were gathered. Sections three through six describe the study's four phases. Each of the sections, three through six, present a description of the dependent variable, the factors (independent variables) used and the rationale for selecting them, the hypotheses examined, and the methods used to analyze the data.

Specifically, Phase I described in the third section employs a 2x5 fixed factor design to determine whether industry or size impacts a corporation's tax burden. Section four describes Phase II of the study. The purpose of this phase is to examine whether selected financial characteristics have an impact on effective tax rates. In other words, is ETR progressive, regressive, or proportional given a specific financial characteristic? The fifth section describes Phase III of the study. Phase III examines whether financial characteristics can be used to predict effective tax rates. The final phase, six,

explains Phase IV of the study. This section investigates whether a corporation's book effective tax rate (BETR) differs from a corporation's effective tax rate (ETR). The only difference between these two approaches is the inclusion of deferred taxes in the calculation of the book effective tax rate. Therefore, by comparing the relationship of BETR with ETR, the impact of deferred taxes can be better understood.

METHODOLOGY

The study employs the current liability method in calculating a corporation's effective tax rate (ETR). Further, the study extends previous research in this area by utilizing a 14-year weighted average approach in calculating each corporation's ETR. This methodology attempts to overcome the methodological limitations found in previous studies. Commenting on the usefulness of examining data longitudinally, Egger [1985, p. 957] states:

> The only economically meaningful time span over which to measure a project's revenues, costs, and tax burdens is its entire economic life. Reports about a business's operations during a shorter time period should take account of deferred income and expense items and tax liabilities.

Since this study measures corporate effective tax rates over an extended period of time, the use of deferred taxes is not necessary.[14]

With the exception of Zimmerman [1983], researchers have failed to examine corporate effective tax rates for an extended period of time. For the most part, previous research has only examined corporate effective tax rates for one or two years. Although Zimmerman [1983] examined corporate effective tax rates across industry for 35 years, his research only examined these rates on a year-by-year basis. By examining effective tax rates on this basis, Zimmerman provides only point estimates of corporate effective tax rates. Spooner [1986, p. 299] in discussing the advantages of the Joint Committee on Taxation [1983] study, which used a four-year weighted average approach, states:

> [with these studies] intertemporal distortions are fewer, and the relative tax burdens borne by different industries can be more accurately measured ... If these studies are published every year and effective tax rates are averaged over a longer period, thus making trends more apparent, these studies should become increasingly valuable.

A second methodological limitation found in previous studies, and is corrected for in this study, is the effect of net operating loss (NOL) carryforwards on a

---

14. As discussed in Chapter 1, the SEC did not require corporations to separately state current and deferred taxes until 1973. Therefore, the longest time frame that can be accurately examined is 14 years.

corporation's tax expense. When a corporation utilizes an NOL carryforward, the corporation's tax expense is calculated on income from continuing operations without regard to the NOL. The benefit derived from the NOL is then presented as an extraordinary item. Thus, the current year's tax expense has been overstated. Prior studies (Zimmerman [1983] and Porcano [1986]) have failed to consider this problem. Therefore, to overcome this methodological limitation and to properly match a corporation's current tax expense with book income, the tax effect of the NOL was removed from current taxes.

A third limitation found in previous ETR studies is their failure to include all corporate income. Prior studies have omitted the effect of dispositions and extraordinary items (Tax Notes [1982a], Tax Notes [1982b], and Joint Committee on Taxation [1983]). Porcano [1986 p. 20], explaining why he included these items, states:

> [these] items are not eliminated because, when these events occur, they usually are substantial in amount and have an impact on tax burden; as such they should be included in all calculations.

Therefore, to provide an accurate portrayal of a corporation's effective tax rate these items must be included in determining a corporation's total income.

A fourth limitation of earlier effective tax rate studies is their failure to include all corporate taxes.

Although this study excludes excise and property taxes, it defines total taxes as current federal, foreign, and state income taxes paid by the corporation. In addition, the tax/benefit from discontinued operations and extraordinary items is also included.

The final methodological weakness found in previous studies (Tax Notes [1982a], Tax Notes [1982b], and McIntyre [1985]) is the their small sample size. With the exception of one year in the Porcano [1986] study, previous studies have only sampled between 250-500 corporations. Typically, the corporations examined have been limited to the Fortune 500. This study differs from prior studies by examining 1,095 firms from the New York and American stock exchange along with firms traded Over-the-Counter.

In conclusion, the methodology employed in this study attempts to overcome the perceived weaknesses found in prior ETR research. The five methodological limitations this study attempts to rectify are:

(1) Failing to examine corporate effective tax rates longitudinally.

(2) Failing to properly account for the tax effect of net operating losses (NOL's).

(3) Failing to include income from discontinued operations and extraordinary items in the study's definition of total income.

(4) Failing to include all current income taxes (i.e., federal, state, and foreign taxes) or failing to include the tax/benefit from discontinued operations and extraordinary items in the study's definition of taxes.

(5) Failing to use a large sample or failing to examine corporations traded on the New York and American stock exchange and Over-the-Counter.

DATA COLLECTION

The financial data used in this study were gathered from the 1987 COMPUSTAT tape. This tape encompasses twenty years of data [1967-1986] and consists of the most actively traded corporations listed on the New York Stock Exchange, American Stock Exchange, and Over-the-Counter market. This study examines the population of firms with SIC numbers between 1000 and 5999 for the period 1973-1986.

A problem in conducting longitudinal studies is how to restate a corporation's financial statements to reflect the impact of mergers and acquisitions. Although COMPUSTAT restates a corporation's financial statements for the effect of mergers and acquisitions, the number of variables that it restates, and the number of years COMPUSTAT restates these variables is limited. Therefore, to circumvent this potential problem, the 1987 COMPUSTAT research tape was used as a supplementary data source for the Primary Secondary and Tertiary (PST) and Over-the-Counter (OTC) tapes. The research tape is a compilation

of corporations that have been removed from the PST and OTC tapes due to acquisition/merger, bankruptcy, liquidation, delisting, or inconsistent reporting. Therefore, the research tape provided a method by which a corporation's financial statements could be restated for the effect of mergers and acquisitions. The following paragraph describes how the research tape was used to restate the PST and OTC tapes.

First, all companies listed on the COMPUSTAT research tape for reasons other than acquisition/merger were deleted. As a result of this procedure, the number of companies that remained on the COMPUSTAT research tape was reduced to 881. Second, for each of the 881 companies remaining on the research tape, The Wall Street Journal Index was used to determine the acquiring company. If the acquiring corporation was currently listed on the PST or OTC tape, the data from the acquired company (i.e., Research Tape) were then merged with the data from the acquiring corporation (PST or OTC Tape). This procedure ensured that the combined data properly reflected the effect of mergers and acquisitions.[15] After restating the PST and OTC tapes for the effects of mergers and acquisitions, the population of corporations with SIC

15. A corporation that acquired or merged with a corporation not listed on the research tape was deemed to have acquired a corporation that would not materially alter their present structure.

codes between 1000 and 5999 was 2,412. However, after removing all companies which had missing data during the 14-year period, the population of corporations examined was reduced to 1,095.

RESEARCH DESIGN AND ANALYSIS (PHASE I)

Phase I of this study employs a 2x5 fixed factor design (Figure 4) to determine whether industry or size has an impact on a corporation's tax burden.

Dependent Variable

The dependent variable used in Phase I was a corporation's effective tax rate. ETR is defined as the ratio of the corporation's total current income tax liability (CTL) to aggregate net income (ANI). A corporation's CTL is defined as the corporation's current tax expense/benefit plus:

(1) the current tax/benefit associated with extraordinary items and

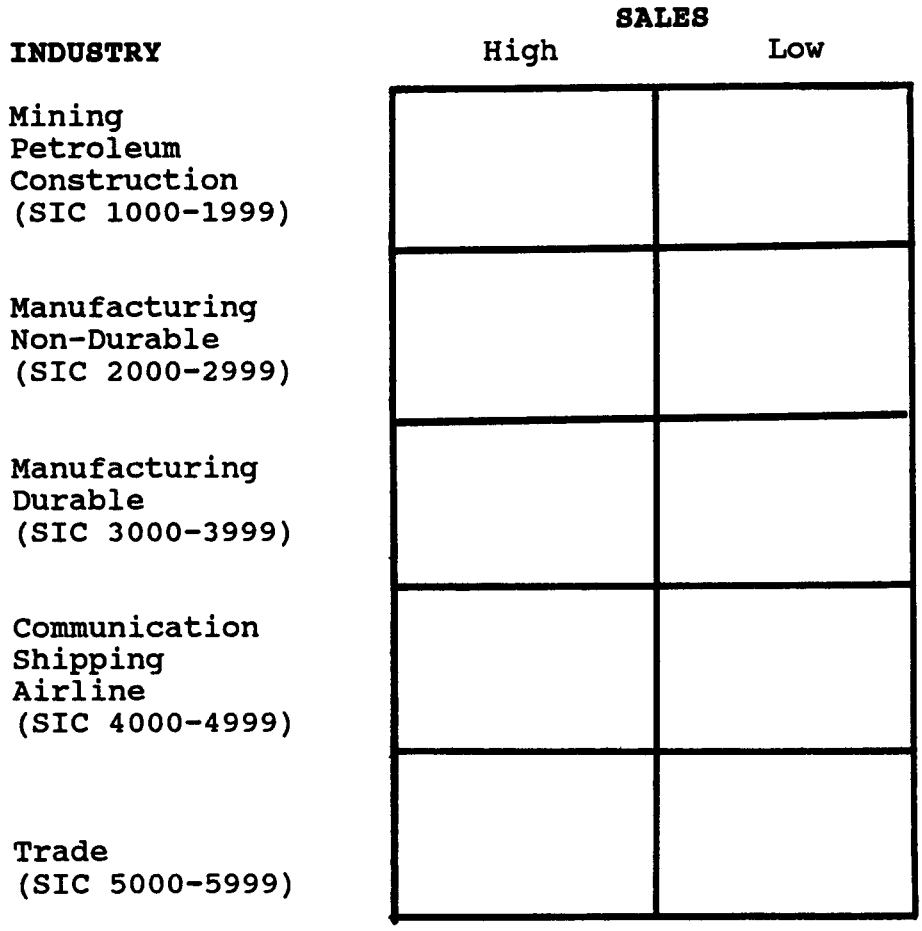
(2) the current tax/benefit associated with gains or losses from dispositions; minus

(3) the benefit derived from net operating loss carryforwards.[16]

A corporation's ANI consists of book income or loss before tax plus:

---

16. Current tax expense (i.e., exclusive of deferred taxes) consists of current federal, state, and foreign taxes.



Dependent Variable: Effective Tax Rate (ETR)

Figure 4: Research design for Phase I

(1) the income/loss from extraordinary items net of the effect of the NOL carryforward,

(2) the gain/loss from dispositions,

(3) the equity income/loss from an affiliate or joint venture, and

(4) the income/loss associated with minority interests.[17]

A corporation's 14-year weighted average ETR was calculated using the following formula:

$$\text{Effective Tax Rate} = \frac{CTL_1 + CTL_2 \ldots CTL_{14}}{ANI_1 + ANI_2 \ldots ANI_{14}}$$

where:

CTL = Current Tax Liability ($Year_1$ ... $Year_{14}$)

ANI = Aggregate Net Income ($Year_1$ ... $Year_{14}$)

Independent Variables

The first factor, industry, has five levels. These levels correspond to five of the eight major Standard Industry Code (SIC) classifications used to separate companies by industry. The five major classifications used in the study were: (1) mining, petroleum, and construction (1000-1999); (2) manufacturing non-durables (2000-2999); (3) manufacturing durables (3000-3999); (4) communications, shipping, and airline (4000-4999); and (5) trade (5000-5999). The purpose of separating companies into industry classifications was to determine whether one industry is

17. Book income is defined as book income from operations.

tax favored over another. Zimmerman [1983], in examining ETR on a yearly basis, used industry as an independent variable and found that ETR does vary across industry. Further, justification for the selection of industry as a independent variable is provided by Stickney [1979, p. 54]: "Effective tax rate analysis can also be used to determine whether particular firms or industries have competitive advantages."

The second factor, sales, is used as a surrogate for size. To ensure that each cell of the research design had a sufficient number of corporations two sales groups (i.e., large and small) were formed. The two groups were formed by ranking the corporations from highest to lowest based on their total sales for the 14-year period and then separating the companies into equal groups. Sales have previously been used as a surrogate for size by Porcano [1986] and Siegfried [1972]. These studies hypothesized that the larger the firm, the lower the corporation's effective tax rate. Specifically, Siegfried believed that:

> (1) Large firms have the resources to influence the political process in their favor.
>
> (2) Large firms have greater resources, which enable them either to develop tax expertise or pay for tax expertise.
>
> (3) Large firms have greater resources, which enable them to organize their activities to minimize taxes.

However, Zimmerman [1983] hypothesized that large firms (i.e., top 50 firms) have higher effective tax rates because these firms are subject to greater government scrutiny and, thus, greater political costs, with taxes representing one type of political cost.[18] In order for Zimmerman's political cost hypothesis to ascent to the level of a theory, the hypothesis must be robust to methodological changes. Since this study employed a methodology that is different than Zimmerman's, this study provides a vehicle for further validating his hypothesis. Therefore, the study examines whether the 50 largest corporations as classified by sales have a higher effective tax rate.

Hypotheses

The principal objective of this study is to determine whether industry classification or size of a corporation impacts effective tax rates. In addition, a secondary objective is to ascertain whether the political cost hypothesis espoused by Zimmerman yields the same conclusions when a different methodology is employed. Therefore, the following hypotheses were examined.

H_0: The average effective tax rates in all five industry classifications are equal.

---

18. For more information concerning the political cost hypothesis see Chapters 11 and 12 of Watts and Zimmerman [1983].

H_0: The average effective tax rates between the high sales group and the low sales group are equal.

H_0: The largest 50 firms, as measured by sales, have a greater ETR than the remaining firms.

In addition, to further explore the relationship between industry and sales, pairwise comparisons were also performed.

Statistical Analysis

The above hypotheses were examined using five different measures of central tendency. Each of the five measures were used to compare whether ETR is affected by size (sales) or industry. The first measure was a 14-year weighted average mean. This measure was calculated by dividing the current tax liability (CTL) of all observations in the group over 14 years by the total income (ANI) of all observations in the group for the same period. This measure places greater emphasis on the larger firms within each group and is expressed in the following formula:

$$ETR_{wa} = \frac{\sum_{i=1}^{n} \sum_{j=1}^{14} CTL}{\sum_{i=1}^{n} \sum_{j=1}^{14} ANI}$$

where:

CTL = Current Tax Liability
ANI = Aggregate Net Income
j = Year

The second statistic used was a 14-year unweighted mean. Unlike the weighted average mean where emphasis is placed on the larger companies within each group, this statistic treats each observation equally. Simply stated, this measure is the mean ETR for each group and is expressed in the following formula.

$$ETR_{uw} = \frac{\sum_{i=1}^{n} \frac{\sum_{j=1}^{14} CTL}{\sum_{j=1}^{14} ANI}}{n}$$

where:

CTL = Current Tax Liability
ANI = Aggregate Net Income
j = Year

The third measure of centrality was the median. The median represents the middle observation when all the observations are ranked from largest to smallest. The median provides useful information when the distribution is asymmetrical [Bhattacharyya and Johnson, 1977].

The fourth measure calculated to test the hypotheses was a trimmed mean. This measure of centrality was calculated by deleting all observations below the first quartile and all observations above the third quartile [Bhattacharyya and Johnson, 1977].

The final measure used was a Winsorized mean. Similar to a trimmed mean in that the first and third quartiles are the focal point of the calculation, a Winsorized mean differs from the trimmed mean by replacing all the observations below the first quartile by the value of the first quartile and all the observations above the third quartile by the value of the third quartile [Bhattacharyya and Johnson, 1977]. The purpose of using the last two measures of central tendency was to determine whether the weighted and unweighted means were undisturbed by the presence of unusual observations [Bhattacharyya and Johnson, 1977].

In addition to examining measures of central tendency, the study examined both the overall and group standard deviations. The standard deviation was used to measure the amount of dispersion from the mean. The smaller the standard deviation within each group and the smaller the differences in the standard deviation between groups, the stronger the conclusions.

RESEARCH DESIGN AND ANALYSIS (PHASE II)

The second phase of the study used two techniques to analyze whether corporate effective tax rates are progressive, regressive, or proportional given a financial characteristic. The first technique employed simple regression. The second technique separated each of the

independent variables into four quartiles. The quartiles were determined by ranking each of the independent variables from lowest to highest. Thus, the first quartile represents firms exhibiting the smallest values of the independent variable and the fourth quartile the largest values. This methodology is the same as used by Porcano [1986]. However, as mentioned earlier, the dependent variable employed in this study is different than the dependent variable used by Porcano.

Dependent Variable

Two dependent variables were used in this phase of the study: a 14-year weighted average ETR and a 14-year unweighted average ETR. They represent two of the five measures of central tendency described in the statistical analysis section of Phase I.

Independent Variables

The five financial characteristics used in this phase of the study are total assets, total sales, aggregate net income, capital expenditures, and debt-to-equity ratio. Each of the five financial characteristics represents a 14-year average of that variable.

Total Assets

Total assets have been used to measure size by Zimmerman [1983] and Porcano [1986]. Although these studies had conflicting hypotheses, the results of each

study supported the each author's hypotheses. Porcano hypothesized that larger firms, as measured by assets, would have lower corporate ETR's since they would be better able to take advantage of tax incentives provided by Congress. Zimmerman hypothesized that the larger the firm, the greater the political scrutiny the firm would be subject to and, thus, the greater the political cost as represented by taxes. Although larger firms might be able to take advantage of the tax incentives in the code, as suggested by Porcano, over time there should be a limit as to how much these tax incentives could reduce a corporation's tax liability. To test which of the these conflicting theories is correct, the following hypothesis was proposed:

> H_0: The average effective tax rates are equal for all levels of total assets.

Total Sales

As discussed in Phase I, sales have been used to measure size in prior studies by Siegfried [1972], Zimmerman [1983], and Porcano [1986]. As discussed in the preceding section on assets, the authors are in conflict as to whether larger firms would exhibit a higher ETR (Zimmerman) than smaller firms or would exhibit a lower ETR than smaller firms (Siegfried and Porcano). Accordingly, the following hypothesis was tested:

> H_0: The average effective tax rates are equal for all levels of total sales.

Capital Expenditures

Clowery et al. [1985] cite depreciation as the most frequently mentioned temporary difference (see Figure 1). They also cite the investment tax credit (ITC) as the sixth most common temporary difference. Congress has used both the investment tax credit and depreciation as tax incentives to spur economic growth. Since both depreciation and ITC reduce a corporation's tax liability, this study hypothesizes that the greater a corporation's capital expenditures, the lower its effective tax rate. To test this notion, the following hypothesis was examined:

> H_0: The average effective tax rate is equal for all levels of capital expenditures.

Debt/Equity Ratio

Stickney and McGee [1982] hypothesized that corporations with high debt to equity ratios have lower effective tax rates. However, the statistical technique employed in their study, cluster analysis, made these conclusions somewhat tenuous. While the results of their study might be questionable, their logic is not. The issuance of debt instead of equity has long been recognized as a tax shield. Since only interest bearing debt provides a tax shield, this study defines debt as the sum of short-term and long-term interest bearing debt. These two variables are represented on the COMPUSTAT data

tape as variables #9 and #34. Stockholder's equity was defined as preferred stock (both redeemable and non-redeemable) and common equity. Common equity includes common stock, additional paid-in-capital, and retained earnings. In testing whether debt to equity is regressive, progressive, or proportional the following hypothesis was examined:

> H_0: The average effective tax rate is equal for all levels of debt to equity.

Aggregate Net Income

For years Congress has been concerned with the public perception that corporations have reported a large net income for financial statement purposes yet paid little or no income taxes. Porcano [1986] examined aggregate net income and found that the smaller the firm the greater the ETR. As in Porcano's study, this study defines aggregate net income (ANI) as a company's book income (loss) before tax, plus income (loss) from extraordinary items, the gain (loss) from dispositions, the equity income (loss) from an affiliate or joint venture and the income (loss) associated with minority interests. However, unlike Porcano, this study includes current foreign taxes in the numerator of ETR. A problem with Porcano's study is that he only examined the relationship between ETR and ANI for two years.

The Tax Reform Act of 1986 (TRA86) requires that a corporation include one-half of its excess of book income over alternative minimum taxable income in computing its alternative minimum tax liability. However, the potential error Congress might have made in changing the tax law based on ETR studies is that these studies do not provide longitudinal evidence concerning the relationship between ANI and ETR. Therefore, to test whether the legislation enacted by Congress was warranted, the following hypothesis was proposed:

> H_0: The average effective tax rate is equal for all levels of net income.

Statistical Analysis

Two techniques were used to test the hypotheses. The first technique required a three step process to assess whether effective tax rates are regressive, progressive, or proportional given a financial characteristic. The first step was to plot each of the independent variables against the dependent variable to help estimate the relationship (i.e., linear, log, quadratic, etc.) between them. Next, simple regression was used to determine the exact relationship and the correlation between the independent and dependent variables. The third step was to calculate, if possible, the average rate progression coefficient [Musgrave and Musgrave, 1980, pp. 376-378].

This coefficient measures the slope of the curve at a given level of the independent variable.

The second technique required that for each independent variable the corporations be ranked from lowest to highest for purposes of dividing the corporations into equal quartiles. After the quartiles were determined, both a weighted and unweighted mean effective tax rate was calculated for each quartile. By separating the independent variable into size quartiles, the study was able to determine if corporate ETR's are regressive, progressive, or proportional for a given financial characteristic.

RESEARCH DESIGN AND ANALYSIS (PHASE III)

The third phase of the study investigated whether corporate and/or financial characteristics can be used to predict a corporation's tax burden. Unlike Phases I and II where 14 years of data were used, Phase III used only 1986 data.

Dependent Variable

The dependent variable used in this phase of the study was the ratio of a corporation's current tax liability (CTL) to modified book income (MBI). A corporation's current tax liability consists of its current federal, state and foreign taxes minus the benefit derived from net

operating loss carryforwards. Modified book income was defined as income before taxes, plus the equity income/loss from an affiliate or joint venture plus the income/loss associated with minority interests. Unlike in previous phases where both the tax and income effects of discontinued operations and extraordinary items were included, they were excluded from this phase because the timing of these transactions are considered more subjective. That is, a corporation has considerable control over when to recognize an extraordinary loss or discontinue a division. Accordingly, a corporation's current tax rate (CTL) was calculated as follows:

$$CTR = CTL / MBI$$

$$CTL = CFDT + CST + CFRT$$

$$MBI = BIBT + EI + MI$$

where:

CTL = Current tax liability
CFDT = Current federal taxes
CST = Current state taxes
CFRT = Current foreign taxes
BIBT = Book income before tax
EI = Equity income (loss)
MI = Minority income (loss)

Independent Variables

The independent variables used in this phase are total modified book income (MBI) to sales; modified book income to total assets; debt to equity; capital expenditures to modified book income; 1985 net property, plant, and

equipment (PPE) to 1985 gross property, plant, and equipment; the ratio of the number of employees to gross PPE; foreign operations; inventory method (LIFO, FIFO, Other) and industry. The following discussion presents the rationale for the selection of each independent variable and the hypothesized relationship between the variable and CTR. Figure 5 summarizes the independent variables and the hypothesized relationship used in this phase.

INDEPENDENT VARIABLE	**HYPOTHESIZED ASSOCIATION**
MBI/Total Sales	Positive (+)
MBI/Total Assets	Positive (+)
Debt/Equity	Negative (-)
Capital Expenditures/MBI	Negative (-)
1985 Net PPE/1985 Gross PPE	Negative (-)
Number of Employees/Gross PPE	Positive (+)
Foreign Operations	Positive (+)
Industry	Undeterminable
Inventory Method:	
FIFO	Positive (+)
LIFO	Negative (-)
Other	Positive (+)

Figure 5: Hypothesized relationship between the independent variables and the dependent variable CTR.

MBI/Total Sales and MBI/Total Assets

Wilke [1988] found that book income is correlated with CTR. However, he also found that these two measures are not perfectly correlated. Thus, a corporation that has high net income does not necessarily have a high CTR. He

discovered that only 70% of the corporations which had a high CTR also had a high net income. In conducting his study, Wilke chose to use assets as a control for size. However, he failed to present the theoretical justification for choosing assets as a control for size. Maddala [1977, p. 267] pointed out that the use of deflators as a control for size can produce spurious correlations. Citing Kuh and Meyer he states:

> The question of spurious correlation quite obviously does not arise when the hypothesis to be tested has been initially formed in terms of ratios, for instance, in problems involving relative prices.

Thus, there should exist a theoretical justification for using any variable as a control for size. As discussed in Phase II, conflicting theories exist as to whether sales or assets represent a valid control for size. Siegfried [1972] and Porcano [1986] proposed that larger firms are able to lobby for favorable tax treatment or acquire tax expertise, either internally or externally, which allows them to minimize their taxes. If this proposition is correct then neither sales nor assets would provide a valid control for size since there would be an inverse relationship between CTR and sales or assets. That is, larger firms would have lower CTR's. However, if Zimmerman is correct then these variables should be an adequate control for size. Since the dependent variable used in this study is similar to the dependent variable

used by Zimmerman, (i.e., Porcano did not include foreign taxes) the hypothesized relationship between CTR and these variables (i.e., MBI to Total Sales and MBI to Total Assets) should be positive. In other words, the larger theses ratios, the larger CTR.

Debt/Equity

As discussed in Phase II, debt has long been considered a tax shield. The greater a corporation's debt, ceteris paribus, the greater the corporation's interest expense and the lower its tax liability. As in Phase II, debt is defined as both short-term and long-term interest-bearing debt. Since interest is tax deductible whereas corporate dividend payments are not, ceteris paribus, the higher a corporation's debt to equity ratio, the higher a corporation's interest expense and the lower its effective tax rate. Therefore, the study hypothesized that the relationship between CTR and debt to equity would be negative.

Capital Expenditures/MBI

The rationale for selecting current capital expenditures as a separate variable is to examine whether lower depreciation deductions on first-year assets and the Investment Tax Credit (ITC) have an effect on CTR. If the study did not separate current capital expenditures from total property, plant, and equipment, the impact of these

two important tax incentives would have been overlooked. MBI should provide a valid control for size since a corporation's MBI is a function of both depreciation and ITC. Since capital expenditures and ITC reduce a corporation's current tax liability, the study hypothesized that the higher a corporation's capital expenditures to MBI, the lower its CTR.

1985 Net PPE/1985 Gross PPE

The rationale for selecting this variable is that the larger a corporation's undepreciated capital investment, in terms of property, plant, and equipment (PPE), the larger its future depreciation deduction. Clowery et al. [1985] (see Figure 1) found that depreciation is the most frequently disclosed temporary difference. By examining net and gross PPE at the beginning of the year, the study avoids the potential problem of double counting the impact of current capital expenditures in the regression equation. As with capital expenditures, the study hypothesized that a corporation's CTR is negatively associated with the ratio of 1985 net PPE to 1985 gross PPE.

Employees/Gross PPE

This variable was selected to test whether labor intensive firms have a greater tax burden than capital intensive firms. Economic theory suggests that if a

corporation has finite resources, there exists a mutually exclusive relationship between labor and capital. That is, for every dollar invested, it can be either spent on labor or capital (i.e., PPE). Theory further suggests that the more capital intensive the firm, the fewer the employees. Since we have hypothesized that capital intensive firms should exhibit a negative association with ETR, it follows that labor intensive firms should exhibit a positive association with ETR. Therefore, it is hypothesized that the smaller this ratio, the lower the corporate tax burden.

Foreign Operations

A corporation which engages in business abroad faces a potentially higher tax burden than a corporation whose income is only attributable to the U.S. While the tax paid in most countries is eligible for the foreign tax credit (FTC), in some countries, the foreign tax imposed is not considered an income tax and, therefore, is deemed to be a non-creditable tax. That is, the tax would not be eligible for the foreign tax credit. In addition, in some countries, the income tax rates exceed the U.S. tax rates and place an additional tax burden on the corporation.

Although a corporation's foreign income is not disclosed in its financial statements, the Security Exchange Commission (SEC) requires that this information

be disclosed in the footnotes to the financial statements. While the data source used in this study, COMPUSTAT, does not provide foreign income, it does provide information concerning a corporation's foreign income tax liability. The study assumed that a corporation which has a foreign income tax liability should have foreign income. Since the exact relationship between foreign taxes and foreign income could not be determined due to the data constraint, a dummy variable (0 = no foreign tax or 1 = foreign tax) was used to represent foreign operations. The study hypothesized that corporations which have foreign operations have a higher corporate tax burden than those without foreign operations (i.e., positively associated).

Industry

Industry was selected as an independent variable since prior studies (Zimmerman [1983], Huelten and Robertson [1984], and McIntyre [1985]) have suggested that different industries have different tax rates. Zimmerman's research found that oil and gas companies (SIC 1000-1999) have a lower ETR than other industries. Huelten and Robertson discovered that capital intensive manufacturing firms (SIC 2000-4000) have a lower CTR when compared to high-tech firms while McIntyre cites the aerospace industry (SIC 4000-4999) as having tax advantages.

Like foreign operations, industry is a qualitative, rather than a quantitative, variable. Therefore, a dummy variable was used to code each industry. Further, since the results of prior research studies are inconclusive and suggest that the tax benefits enjoyed by each industry differ, hypothesizing the sign of the industry variables would be extremely subjective. Thus, the hypothesized direction of each industry was not attempted. However, it should be mentioned that if Congress has been even handed in their use of tax incentives, none of the industry variables should be significant.

Inventory Method

A corporation's inventory method is a qualitative, rather than a quantitative, variable. Accordingly, a dummy variable was used to determine whether a corporation's inventory method impacts CTR. COMPUSTAT separates inventory into eight categories; seven of these categories represent a different method of inventory and the eighth signifies that a corporation does not maintain an inventory. While the majority of corporations examined used either the FIFO or LIFO method, the study also considered the effect of other inventory methods by classifying the corporations into three inventory groups: Group 1-FIFO; Group 2-LIFO; and Group 3-Other.

A corporation which adopts the LIFO method of inventory typically experiences a higher cost of goods sold than a corporation which uses the FIFO method. A higher cost of goods sold translates into a lower MBI. Williams et al. [1987] reporting on a 1980 study by Biddle states:

> Many corporations have voluntarily paid tens of millions of dollars in additional income taxes by continuing to use FIFO rather than switch to LIFO.

Further, Stanga and Reeve [1987] found that the tax savings of the LIFO method are further enhanced by minimizing the number of inventory pools. Specifically, they found that there exists an inverse relationship between the number of LIFO pools and tax savings. In addition, Stanga and Reeve found that the retail industry (i.e., Trade SIC 5000-5999) has more pools than other industries. Accordingly, the study hypothesized that there exists a positive relationship between FIFO and CTR, a positive relationship between other methods and CTR, and a negative relationship between LIFO and CTR.

Statistical Analysis

The statistical technique used in analyzing the data was stepwise multiple regression. Two modifications of this procedure (forward and backward) were also used to verify that the proper model was obtained. The stepwise procedure allows the researcher to select the "best"

possible model, assuming that the "best" model exists [Neter, Wasserman, and Kutner, 1985]. Proper application of this technique requires that the data be randomly separated into two groups, with the first group functioning as the coefficient and variable estimation group and the second group as the testing or verification group. Accordingly, this study randomly separated the data into two groups via a computer based random number generator. In analyzing the verification group, the models' R^2 and any differences between the actual sign and the hypothesized sign of the coefficients were examined to determine the effectiveness of the model.

RESEARCH DESIGN AND ANALYSIS (PHASE IV)

The fourth phase of the study also used a 2x5 fixed factor design (Figure 6). This phase investigated whether a corporation's book effective tax rate (BETR) differs from a corporation's effective tax rate (ETR). The only difference between these two approaches is the inclusion of deferred taxes in the book effective tax rate calculation. Therefore, by comparing the relationship of ETR with BETR the impact of deferred taxes can be better understood.

INDUSTRY	SALES: High	SALES: Low
Mining Petroleum Construction (SIC 1000-1999)		
Manufacturing Non-Durable (SIC 2000-2999)		
Manufacturing Durable (SIC 3000-3999)		
Communication Shipping Airline (SIC 4000-4999)		
Trade (SIC 5000-5999)		

Dependent Variable: BTD = ETR minus BETR

Figure 6: Research design for Phase IV

Dependent Variable

The dependent variable used in this phase of the study is the difference between a corporation's effective tax rate (ETR) and its book effective tax rate (BETR) and is referred to as book tax difference (BTD). The book effective tax rate is the ratio of book income tax expense (BTE) to aggregate net income (ANI). A corporation's BTE is defined as the company's tax expense/benefit, as set forth in the income statement, plus the tax expense/benefit associated with extraordinary items and dispositions, minus the benefit derived from net operating loss carryforwards. A corporation's ANI is defined in the same manner as in Phase I. This phase of the study also calculated a corporation's BETR using a 14-year weighted average approach. Therefore, BETR is calculated as follows:

$$\text{Book Effective Tax Rate} = \frac{BTE_1 + BTE_2 \ldots BTE_{14}}{ANI_1 + ANI_2 \ldots ANI_{14}}$$

where:

BTE = Book Tax Expense ($Year_1 \ldots Year_{14}$)

ANI = Aggregate Net Income ($Year_1 \ldots Year_{14}$)

A corporation's ETR is calculated in the same manner as in Phase I of the study: a 14-year weighted average approach (see page 63). Thus, BTD is measured as follows:

$$BTD = ETR - BETR$$

If deferred taxes are constantly reversing, so that BETR is not always greater than ETR, then the 14-year weighted average ETR should approximate the 14-year weighted average BETR. In other words, BTD should be approximately zero. Since deferred taxes cause the difference between BETR and ETR a BTD of approximately zero would indicate that deferred taxes do not represent a "constant" liability to corporations.

Independent Variables

The same factors as used in Phase I, industry and sale, are used in this phase of the study.[19]

Hypotheses

The question examined was whether ETR minus BETR is zero (i.e., BTD = 0). Specifically, the study attempted to ascertain whether BTD is consistent across industry and sales classification. Therefore, the following hypotheses were tested:

H_o: The differences (i.e., BTD) between ETR and BETR are equal across all five industry classifications.

H_o: The differences (i.e., BTD) between ETR and BETR are equal across sales classifications.

Statistical Analysis

The examination of BETR, or more importantly whether deferred taxes represent a "constant" liability over time,

19. Since the rationale for selecting these two factors has been discussed in detail in Phase I it is omitted.

is a natural extension of the analysis conducted in the first phase of the study. Accordingly, the above hypotheses, were examined using the five measures of central tendency used in Phase I. These five measures of central tendency are:

1. A 14-year weighted mean.
2. An unweighted 14-year mean.
3. The median.
4. A trimmed mean.
5. A Winsorized mean.

In addition, as in Phase I, the overall standard deviation and group standard deviations were examined to measure the amount of dispersion from the measures of central tendency.

CHAPTER 5

DISCUSSION OF THE RESULTS

INTRODUCTION

This chapter is divided into five sections. The first section, entitled, Sensitivity Analysis, discusses the three sensitivity tests performed on the data. Section two sets forth the results from Phase I of the study. Phase I was designed to assess whether corporate effective tax rates (ETR) remain unchanged over industry and sales. The results of Phase II are presented in section three. The purpose of this phase was to determine whether ETR is regressive, progressive, or proportional given a financial characteristic. The fourth section discusses the results of Phase III. This phase examined whether financial characteristics could be used to predict ETR. Section five explains the results of Phase IV. The fourth phase of the study was designed to measure whether, over time, a corporation's effective tax rate (ETR) equals its book tax rate (BETR). The results of this phase should provide insights into the area of deferred taxes.

The study examined all the firms on the 1987 COMPUSTAT tape which had the necessary data for the 14 year period 1973 to 1986 and whose SIC classification was 1000 to 5999. Since the study examined a population of firms and

not a sample of firms, inferential statistics were not used to test the hypotheses. Therefore, a criteria had to be established for accepting or rejecting a hypothesis. The criteria used in this study to delineate between a meaningful and non-meaningful difference is .04. For example, if the ETR for large sales firms was .345 and the ETR for small sales firms was .302, the hypothesis that the firms are equal with respect to size, as measured by sales, would be rejected because the difference between the groups is greater than .04

In order to properly compare the mean ETR's across industries, between groups, and within industry the standard deviation of these means also had to be examined. If a meaningful difference is found between the ETR's of two groups, yet the standard deviation of the ETR's is large, the researcher needs to question whether the majority of companies in each of these groups are really different. In other words, while the mean ETR indicates that there is a meaningful difference between the two groups, the standard deviation could indicate that the companies within the group are similar. Throughout this chapter, the researcher sets forth the results from examining the standard deviation across industries, between sales groups, and within industry.

SENSITIVITY ANALYSIS

During the development stage of the research project three decisions were made that potentially could have altered the results of the study. An important aspect of data analysis is to determine whether the conclusions reached in this study would have been affected by these decisions. A useful technique in assessing whether the decisions made in the development stage impacted the results of the study is sensitivity analysis. Simply stated, sensitivity analysis requires that the researcher assess the impact, if any, between competing alternatives.

Sales Grouping

The first decision that was made concerned the independent variable sales. The question examined was whether the two sales groups (i.e., large and small) should be determined by ranking all the companies in the study according to sales, thereby, ensuring two equal groups with respect to sales or whether the companies be ranked according to sales within each industry, thereby, ensuring equal groups within industry. Since it would be unfeasible to test the sensitivity of the three decisions to all the statistical measures of central tendency employed in the study, the sensitivity analysis was conducted using just the 14-year weighted average approach.

Table 1 sets forth the results of this analysis. The table indicates that the only industry group that was affected by the change in grouping is the small SIC 4000-4999 companies. By using the ranking by industry criteria the ETR would be .047 lower (i.e., .204 versus .157). The impact of the different sales groups is apparent when comparing the large and small companies in the SIC 4000-4999 classification. If the by industry grouping was used, a meaningful difference .027 (i.e., .130 versus .157) would not be found. However, if the firms were grouped without regard to industry a meaningful difference of .074 (i.e., .130 versus .204) exists. Thus, two different conclusions with respect to this industry (SIC 4000-4999) could be reached depending upon the sales classification employed.

Since only one group was affected by the method of classifying companies, the decision was made to classify the companies into large and small without regard to industry. The rationale for selecting this method was to ensure that all large companies were, in fact, the largest companies with respect to sales. For example, if the other method (i.e., without regard to industry) was employed, it would be possible for a company to be classified as large with respect to SIC 5000-5999 but, in fact, be much smaller than a company ranked small in SIC 2000-2999. This potential problem would affect the

Table 1. Measuring the sensitivity of changing the sales classification on effective tax rates using a 14-year weighted average.

SIC Code Industry	RANKED Without Regard to Industry	RANKED By Industry	Difference
		LARGE	
1000-1999 Mining Petroleum Construction	.382	.369	.013
2000-2999 Manufacturing Non-Durable	.425	.425	.000
3000-3999 Manufacturing Durable	.405	.405	.000
4000-4999 Communication Shipping Airline	.130	.130	.000
5000-5999 Trade	.357	.355	.002

Table 1. (continued)

SIC Code Industry	RANKED Without Regard to Industry	RANKED By Industry	Difference
		SMALL	
1000-1999 Mining Petroleum Construction	.244	.249	-.005
2000-2999 Manufacturing Non-Durable	.412	.415	-.003
3000-3999 Manufacturing Durable	.411	.419	-.008
4000-4999 Communication Shipping Airline	.204	.157	.047
5000-5999 Trade	.442	.434	.008

hypothesis that the mean ETR of large sales firms is equal to the mean ETR of small sales firms.

Missing Data

The second decision that needed to be made was how to treat missing data. The data source used in the study was the COMPUSTAT tapes, specifically the Primary, Secondary and Tertiary tape and the Over-the-Counter tape. The total number of companies on these two tapes is 3,214 -- 2,362 and 852 respectively. However, since this was a longitudinal study which required 14 years of data for over 15 variables, there existed a potential problem of missing data. There are three reasons why missing data could occur:

(1) The company was formed after the first year in which data was required (i.e., 1973).

(2) The company was initially a private company that went public after 1973.

(3) The data source, for whatever reason, has failed to provide the information.

Nevertheless, the reason for missing data is not as important as the impact missing data could have on the results of the analysis. While the researcher realizes that no test can replicate missing data, the following is an attempt to understand the possible impact the missing data could have on the results.

The following procedure was used to test the sensitivity of the data set to missing data. First, all

companies that had one or more variables of missing data in two or more years were added to the data set, increasing the number of firms from 1,095 to 1,477. Second, the missing data item or items were replaced by the company's mean for that item computed without regard to the missing year. For example, if a company was original deleted from the data set because it was missing net income for one year, the company would be added to the data set and the net income for the missing year would be the average net income of the other years. Table 2 sets forth the results of this procedure.

As the table indicates, only one group (large SIC 2000-2999) showed a change in ETR greater than .02. This change does not have an effect on the comparison of large versus small within SIC 2000-2999 since the difference between these two groups would only change from .013 to .038. In an effort to further test the sensitivity of the data set to missing values, the above procedure was repeated using companies that had four or fewer years of missing data. This increased the data set from 1,477 to 1,593.

As Table 3 reveals, two of the ten cells, large SIC 2000-2999 and small 4000-4999, have changes greater than .02. The change in SIC 2000-2999 impacts the comparison of large and small firms in that industry. If only companies with no missing data are used the difference

Table 2. Measuring the sensitivity of missing data (two or fewer years of data are missing) on effective tax rates using a 14-year weighted average.

SIC Code Industry	Companies With Complete Data	Companies With Missing Data	Difference
	LARGE		
1000-1999 Mining Petroleum Construction	.382	.370	.012
2000-2999 Manufacturing Non-Durable	.425	.454	-.029
3000-3999 Manufacturing Durable	.405	.409	-.004
4000-4999 Communication Shipping Airline	.130	.133	-.003
5000-5999 Trade	.357	.368	-.011

Table 2. (continued)

SIC Code Industry	Companies With Complete Data	Companies With Missing Data	Difference
		SMALL	
1000-1999 Mining Petroleum Construction	.244	.245	-.001
2000-2999 Manufacturing Non-Durable	.412	.416	-.004
3000-3999 Manufacturing Durable	.411	.410	.001
4000-4999 Communication Shipping Airline	.204	.212	.008
5000-5999 Trade	.442	.430	.012

Table 3. Measuring the sensitivity of missing data (four or fewer years of data are missing) on effective tax rates using a 14-year weighted average.

SIC Code Industry	Companies With Complete Data	Companies With Missing Data	Difference
	LARGE		
1000-1999 Mining Petroleum Construction	.382	.362	.020
2000-2999 Manufacturing Non-Durable	.425	.457	-.032
3000-3999 Manufacturing Durable	.405	.401	.004
4000-4999 Communication Shipping Airline	.130	.139	-.009
5000-5999 Trade	.357	.371	-.014

Table 3. (continued)

SIC Code Industry	Companies With Complete Data	Companies With Missing Data	Difference
		SMALL	
1000-1999 Mining Petroleum Construction	.244	.246	-.002
2000-2999 Manufacturing Non-Durable	.412	.416	-.004
3000-3999 Manufacturing Durable	.411	.403	.008
4000-4999 Communication Shipping Airline	.204	.230	-.026
5000-5999 Trade	.442	.431	.011

between large sales firms and small sales firms within SIC 2000-2999 is only .013 (.425 - .412). However, if companies with up to four years of missing data are added to the data set, the difference is .041 and this difference is considered meaningful. Since the results of the study only affect SIC 2000-2999 and the accuracy of the method used to simulate the missing data is uncertain, the decision was made to use only companies that did not have missing data.

Discontinuing Operations and Extraordinary Items

The final decision that was made concerned whether or not to include the effect of discontinued operations and extraordinary items in the denominator of ETR and the resulting tax effect of these items in the numerator. Prior studies (Siegfried [1972], Zimmerman [1983], and Joint Committee on Taxation [1984]) examined effective tax rates on a year-by-year basis and did not include these items. However, Porcano [1986] did include these items, and Spooner [1986] contends that a methodological weakness of many studies is their failure to include these items in constructing a corporation's effective tax rate. The results in Table 4 indicate that including discontinued operations and extraordinary items has no impact on ETR. While the evidence suggests that the inclusion of these items is unwarranted, the researcher concurs with Spooner

Table 4. Measuring the sensitivity of removing discontinued operations and extraordinary items from the dependent variable when the dependent variable is calculated using a 14-year weighted average.

SIC Code Industry	With Disc. Operations and Extra. Items	Without Disc. Operations and Extra. Items	Difference
	LARGE		
1000-1999 Mining Petroleum Construction	.382	.387	.005
2000-2999 Manufacturing Non-Durables	.425	.425	.000
3000-3999 Manufacturing Durables	.405	.406	-.001
4000-4999 Communication Shipping Airline	.130	.139	-.009
5000-5999 Trade	.357	.356	.001

Table 4. (continued)

SIC Code Industry	With Disc. Operations and Extra. Items	Without Disc. Operations and Extra. Items	Difference
		SMALL	
1000-1999 Mining Petroleum Construction	.244	.243	.001
2000-2999 Manufacturing Non-Durable	.412	.410	.002
3000-3999 Manufacturing Durable	.411	.408	.003
4000-4999 Communication Shipping Airline	.204	.201	.003
5000-5999 Trade	.442	.441	.001

that methodologically these items should be included in ETR since, on a company-by-company basis, these items affect a corporation's ETR. Thus, discontinued operations and extraordinary items and their tax effects were included in the calculation of a corporation's effective tax rate.

In summary, two of the sensitivity tests, the sales classification and missing data, reveal that the conclusions for two of the within industry comparisons would be different. However, overall the sensitivity analysis suggests that the data is robust to the initial decisions concerning the research design, the compilation of the data set (i.e., missing data), and the dependent variable.

PHASE I

The first phase of the study employed a 2x5 fixed factor design to determine whether industry or size impacts a corporation's tax burden. The dependent variable used was a corporation's effective tax rate. Seven different measures of central tendency were used to assess this question. Accordingly, the results of each measure are presented separately.

Unweighted

The unweighted approach treats each corporation's 14-year weighted ETR equally. For example, in determining the mean ETR for the cell, SIC 1000-1999 small sales, the unweighted measure represents the mean ETR of all companies in that cell. The results of this measure are set forth in Table 5. The hypothesis that both sales groups have equal ETR's is rejected. The ETR for the large sales group is .329, whereas the ETR for the small sales group is .472. Figure 7 shows the comparisons between the sales groups within each industry (i.e., large sales versus small sales within SIC 1000-1999) and indicates that differences do exist between large sales and small sales companies. With the exception of SIC 1000-1999 all the differences are in the hypothesized direction. That is, the researcher hypothesized that if a difference did exist this difference would indicate that large sales corporations have lower ETR's than small sales firms.

A possible explanation for why small firms within SIC 1000-1999 have lower ETR's than large firms is that since 1974 large firms have not been allowed to use percentage depletion, but rather, must use cost depletion to expense the costs associated with the exploration and development of oil and gas properties. Percentage depletion allows

firms to write-off exploration and mining costs faster then under the cost depletion method.

The hypothesis that all industries have the same ETR is also rejected. The industry means range from .176 in SIC 4000-4999 to .523 for SIC 3000-3999. The results indicate that all industries do not have equal ETR's.

The standard deviations indicate that both the industry means and the mean of large and small sales have tremendous variability. The industry standard deviations range from .123 to 1.08 while the standard deviation between sales groups differs by .73.

Finally, the overall mean for the 1,095 companies examined is .400 and is within .01 of the results achieved by Siegfried [1972]. The Siegfried study is the only other study which examined ETR's on an unweighted basis.

Weighted

Unlike the unweighted approach, where each observation within the cell is treated equally, the weighted approach places greater emphasis on larger companies within each cell. Specifically, the weighted approach calculates the mean ETR for each cell by summing the current tax liability (CTL) for all companies in the cell and dividing it by the aggregate net income (ANI) for all companies in the cell. Table 6 presents the results from this measure.

Table 5. Measuring the mean corporate effective tax rate and standard deviation using a 14-year unweighted average.

SIC Code Industry	Overall	Grouped by Sales: Large	Grouped by Sales: Small	Difference
1000-1999				
Mining	.312	.363	.280	.083
Petroleum	(.501)	(.234)	(.614)	(-.380)
Construction				
2000-2999				
Manufacturing	.395	.351	.447	-.096
Non-Durable	(.312)	(.179)	(.412)	(-.233)
3000-3999				
Manufacturing	.523	.430	.578	-.148
Durable	(1.08)	(.300)	(1.35)	(-1.05)
4000-4999				
Communication	.176	.156	.220	-.064
Shipping	(.123)	(.116)	(.129)	(-.013)
Airline				
5000-5999				
Trade	.423	.389	.467	-.078
	(.159)	(.114)	(.194)	(-.080)
Total	.400	.329	.472	-.143
	(.701)	(.229)	(.960)	(-.731)

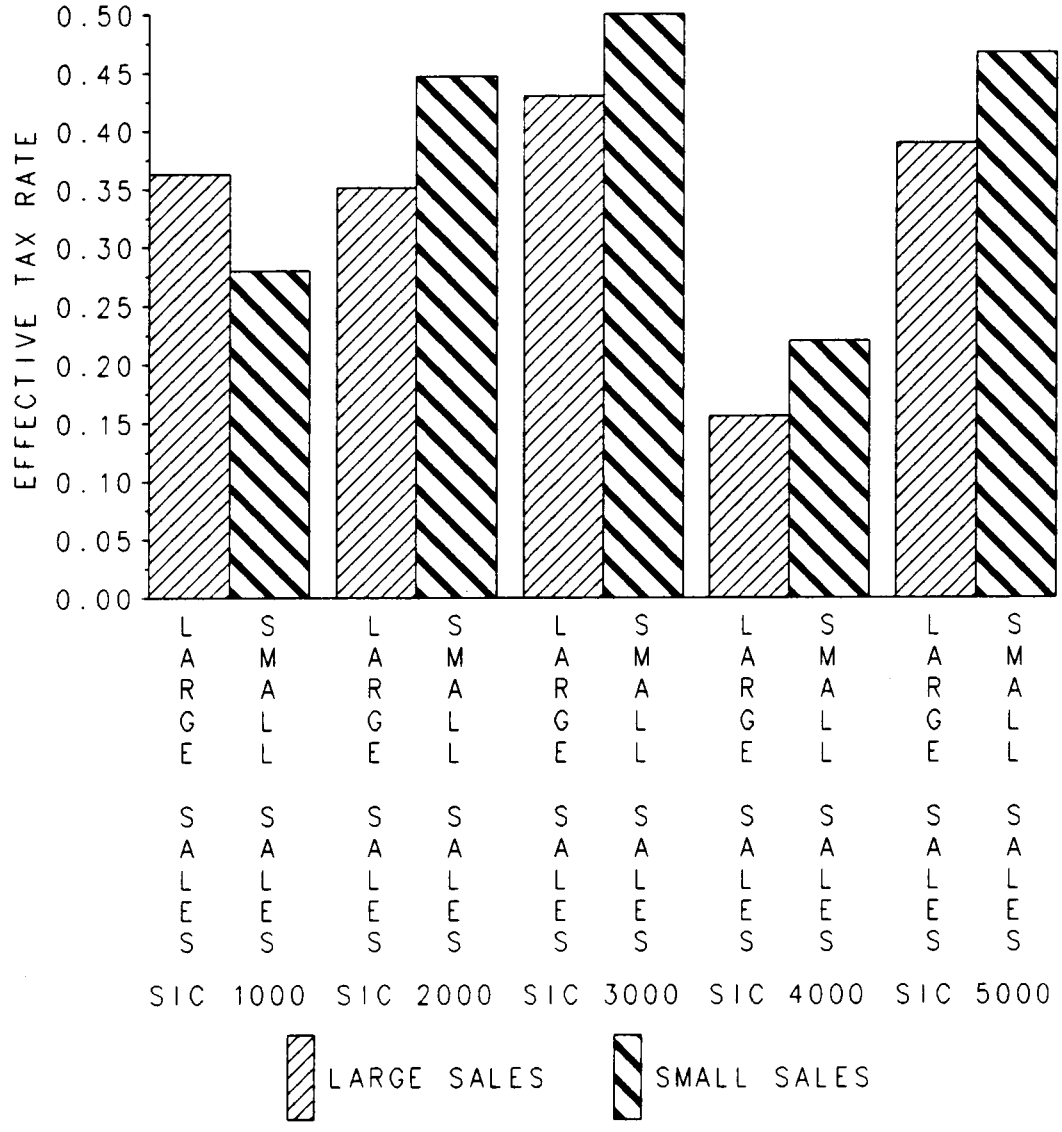


Figure 7. Comparison of effective tax rates by sales and industry using a 14-year unweighted average (see Table 5).

The hypothesis that all industries have the same ETR is rejected. The industry ETR's ranged from .133 for SIC 4000-4999 to .425 for SIC 2000-2999. The hypothesis that the large sales group is different than the small sales group is not rejected. The difference between these two groups is only .021 and is not meaningful. Figure 8 reveals the within industry comparisons between sales groups. As the figure shows, there exists a difference between sales in SIC 1000-1999, SIC 4000-4999, and SIC 5000-5999. All the differences are in the hypothesized direction (i.e., large firms have lower ETR's) except SIC 1000-1999. However, the sign of the difference in SIC 1000-1999 is consistent with the results using the unweighted approach.

The standard deviation across industries range from .189 to .097 while the standard deviation between sales groups and within industry are minimal. The standard deviations under the weighted method are much narrower than under the unweighted method because the former method gives more weight to firms with large ANI's than firms with small ANI's. As a result of the consistency in standard deviation across industry and between sales groups, greater reliability can be placed on the conclusions reached for the weighted measure then with the unweighted measure.

Table 6. Measuring the mean corporate effective tax rate and standard deviation using a 14-year weighted average.

SIC Code Industry	Overall	Grouped by Sales Large	Small	Difference
1000-1999 Mining Petroleum Construction	.350 (.189)	.382 (.176)	.244 (.193)	.138 (-.017)
2000-2999 Manufacturing Non-Durable	.425 (.125)	.425 (.125)	.412 (.146)	.013 (-.021)
3000-3999 Manufacturing Durable	.406 (.165)	.405 (.163)	.411 (.192)	-.006 (-.029)
4000-4999 Communication Shipping Airline	.133 (.109)	.130 (.108)	.204 (.119)	-.074 (-.011)
5000-5999 Trade	.362 (.097)	.357 (.095)	.442 (.082)	-.085 (.013)
Total	.333 (.182)	.332 (.182)	.353 (.184)	-.021 (-.002)

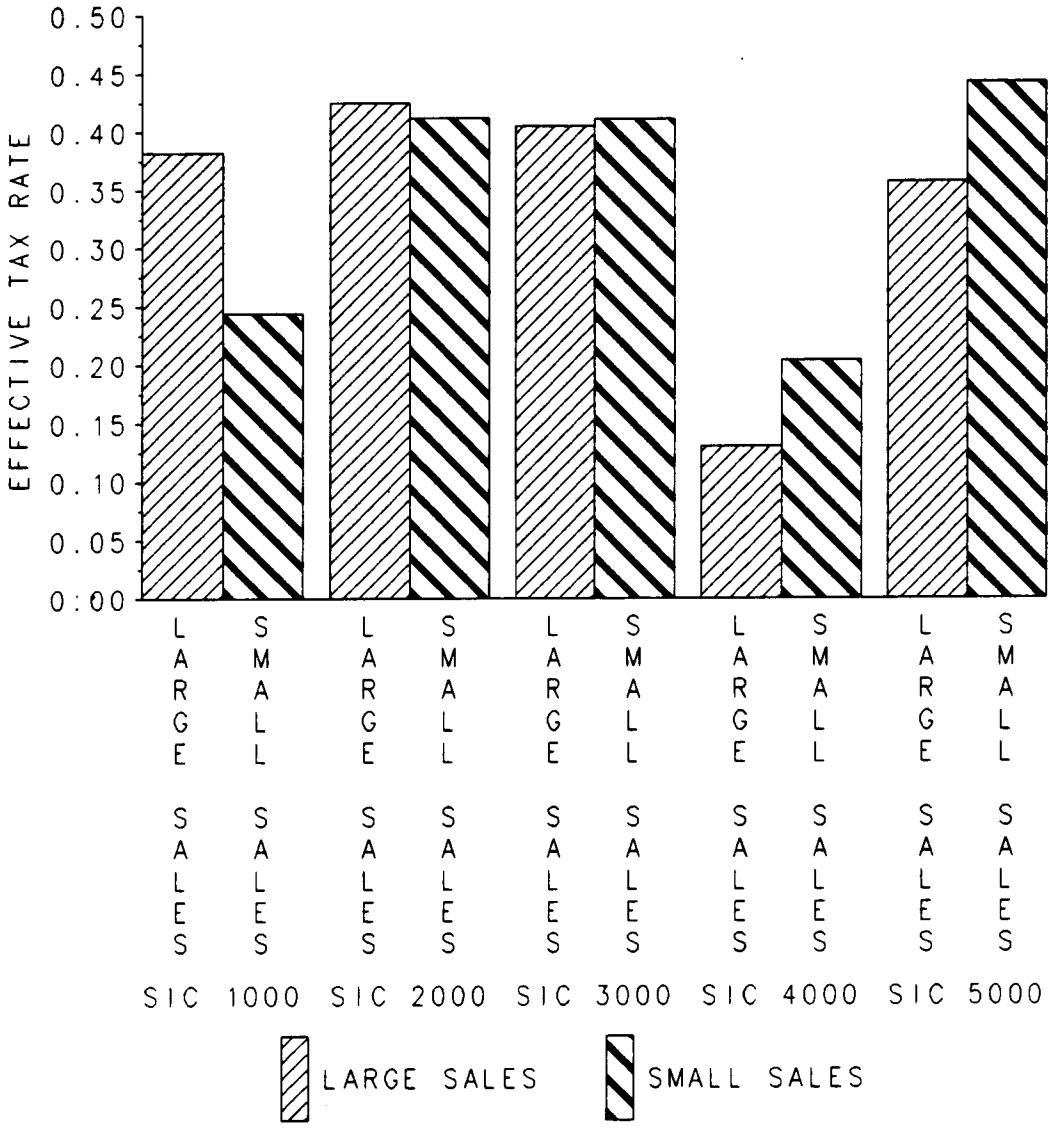


Figure 8. Comparison of effective tax rates by sales and industry using a 14-year weighted average (see Table 6).

Finally, the overall ETR using this approach is .333. This overall effective tax rate is higher than previous studies (Joint Committee on Taxation [1984], Tax Notes [1982a], Tax Notes [1982b], and McIntyre [1985]). With the exception of the McIntyre study, which had an ETR of .15, all of the other studies had an ETR of approximately .29. While it appears that the results of both Tax Notes studies are similar to those presented here, the method they employed (i.e., partial approach) typically reflects a higher ETR, especially when used in single year studies. Thus, the ETR's in this study are different, and much higher, than those found in the Tax Notes studies. The ETR's in this study are different from previous studies because:

(1) This study examined twice as many corporations as previous studies.

(2) This study examined the corporations over a longer period of time.

(3) This study examined corporations from all three stock exchanges, not just large corporations.

Overall, the results suggest that previous studies which have used the weighted average approach have understated corporate effective tax rates.

Trimmed Unweighted

The trimmed mean is calculated by deleting all the observations above the 75th percentile and all the observations below the 25th percentile. Bhattacharyya and

Johnson [1977] claim that the trimmed mean is undisturbed by the presence of a small fraction of unusual observations. The study uses the trimmed mean and the Winsorized mean (discussed later) to explore the impact of large and small ETR's on the results of the unweighted and weighted measures.

As with the unweighted mean, Table 7 reveals that there is a meaningful difference between industry groups. Accordingly, the hypothesis that the mean effective tax rate for all industries is equal is rejected. The industry means ranged from .334 for SIC 4000-4999 to .389 for 5000-5999 and represents a meaningful difference of .055. Unlike the unweighted average approach, the study fails to reject the hypothesis that there is a difference between large and small firms.

All of the within industry comparisons between large and small sales groups indicate that there is not a meaningful difference between the groups. Finally, the standard deviations of all the groups are consistent and ranged from .073 to .039, a difference of only .034.

Trimmed Weighted

Table 8 sets forth the results of the trimmed weighted mean. In addition, a graphic presentation of this measure is found in Figure 9. The hypothesis that all industries have the same ETR is not rejected. The range between the

Table 7. Measuring the trimmed mean corporate effective tax rate and standard deviation using a 14-year unweighted average.

SIC Code Industry	Overall	Grouped by Sales Large	Small	Difference
1000-1999 Mining Petroleum Construction	.340 (.058)	.328 (.073)	.349 (.046)	-.021 (.027)
2000-2999 Manufacturing Non-Durable	.372 (.051)	.363 (.048)	.382 (.052)	-.019 (-.004)
3000-3999 Manufacturing Durable	.374 (.050)	.377 (.047)	.372 (.051)	.005 (-.004)
4000-4999 Communication Shipping Airline	.334 (.050)	.338 (.056)	.330 (.044)	.008 (.012)
5000-5999 Trade	.389 (.045)	.382 (.047)	.399 (.039)	-.017 (.008)
Total	.371 (.051)	.368 (.051)	.374 (.052)	-.006 (-.001)

Table 8. Measuring the trimmed mean corporate effective tax rate and standard deviation using a 14-year weighted average.

SIC Code Industry	Overall	Grouped by Sales Large	Small	Difference
1000-1999 Mining Petroleum Construction	.342 (.059)	.337 (.062)	.353 (.048)	-.016 (.014)
2000-2999 Manufacturing Non-Durable	.366 (.044)	.365 (.043)	.387 (.049)	-.022 (-.006)
3000-3999 Manufacturing Durable	.378 (.037)	.378 (.035)	.376 (.050)	.002 (-.015)
4000-4999 Communication Shipping Airline	.346 (.054)	.347 (.054)	.336 (.049)	.011 (.005)
5000-5999 Trade	.375 (.057)	.373 (.058)	.406 (.031)	-.033 (.027)
Total	.368 (.046)	.368 (.045)	.376 (.051)	-.008 (-.006)

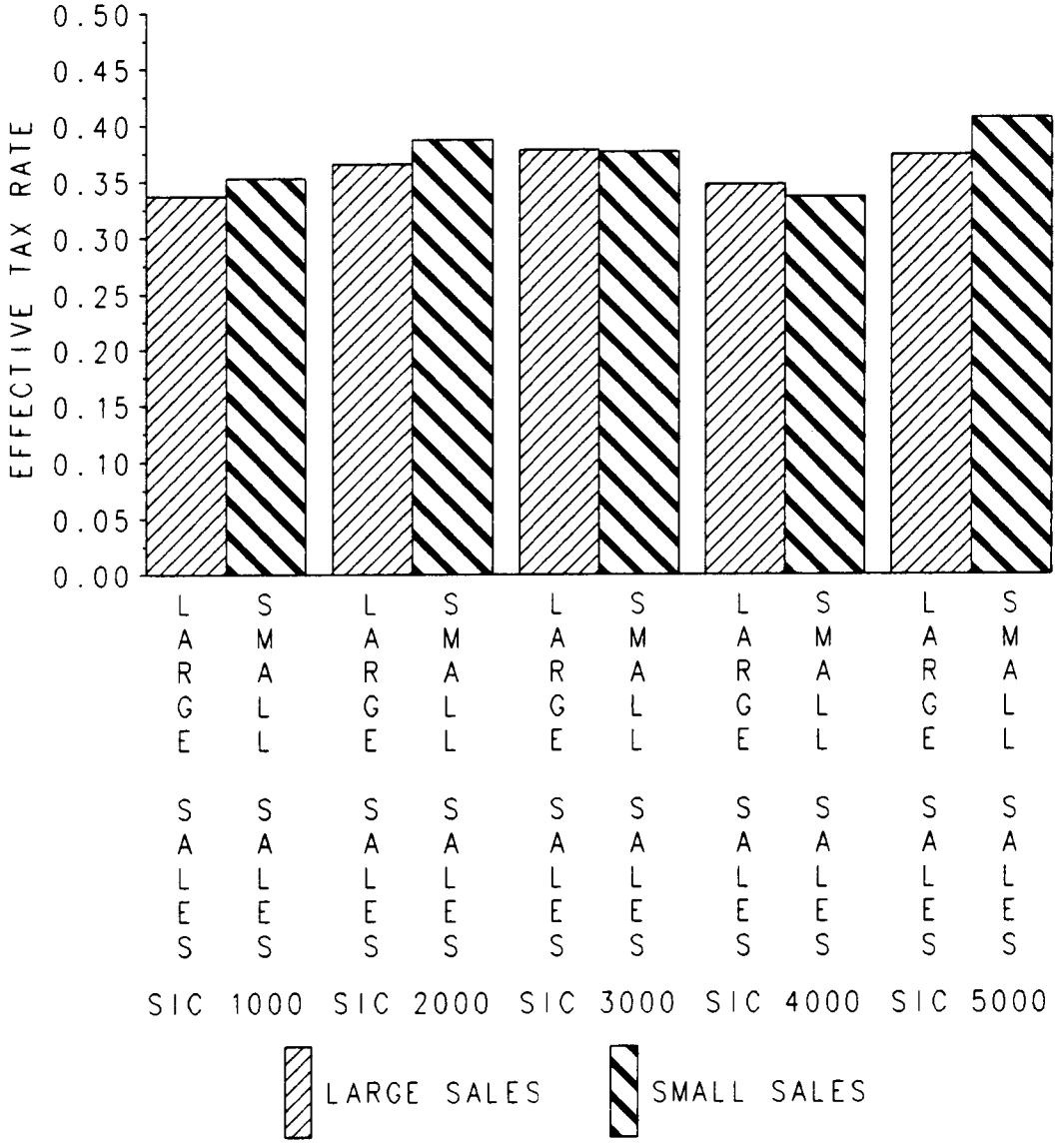


Figure 9. Comparison of effective tax rates by sales and industry using a 14-year weighted trimmed mean (see Table 8).

highest and lowest ETR is .036, and is not a meaningful difference.

The hypothesis that there is difference between large and small sales corporations is rejected. As Table 8 indicates the difference between these two groups is only .008. In comparing large and small firms within industry no meaningful differences existed. Finally, the standard deviations between groups and across industries are small and consistent and, thus, do not impact the conclusions reached by this measure.

Winsorized Unweighted

The Winsorized mean is similar to the trimmed mean in that the 25th and 75th percentiles are the focal point of the calculation. However, unlike the trimmed mean where the observations above the 75th and below the 25th are removed from the data set, the observations above the 75th are replaced by the observation at the 75th percentile and those below the 25th percentile are replaced by the observation at the 25th percentile.

The results of using the unweighted Winsorized mean are presented in Table 9. The hypothesis that both sales groups have equal means is not rejected since the difference between the groups is only .03. The hypothesis that all industries have the same mean is rejected. The industry means ranged from .274 for SIC 4000-4999 to .393

Table 9. Measuring the Winsorized mean corporate effective tax rate and standard deviation using a 14-year unweighted average.

SIC Code Industry	Overall	Grouped by Sales: Large	Grouped by Sales: Small	Difference
1000-1999 Mining Petroleum Construction	.329 (.083)	.345 (.090)	.318 (.079)	.027 (.011)
2000-2999 Manufacturing Non-Durable	.373 (.071)	.358 (.071)	.392 (.065)	-.034 (.006)
3000-3999 Manufacturing Durable	.387 (.066)	.383 (.068)	.389 (.065)	-.006 (.003)
4000-4999 Communication Shipping Airline	.274 (.047)	.268 (.042)	.286 (.056)	-.018 (-.014)
5000-5999 Trade	.393 (.062)	.379 (.067)	.411 (.051)	-.032 (.016)
Total	.360 (.078)	.345 (.079)	.375 (.074)	-.030 (.005)

for SIC 5000-5999 a difference of .119. In addition, none of the within industry comparisons revealed any meaningful differences. Finally, the standard deviations across all industries and between groups is consistent and relatively small.

Winsorized Weighted

The results of this measure are presented in Table 10. As with the unweighted Winsorized measure, the hypothesis that all industry means are equal is rejected. The range of these means is .133, with SIC 4000-4999 having a mean of .265 and SIC 3000-3999 a mean of .388. The hypothesis that the mean of both sales groups is equal is not rejected since the difference between the two groups is only (-.015).

The examination of the affect of size within industry revealed a meaningful difference for SIC 1000-1999 and SIC 5000-5999. The difference between the large sales and small sales corporations is .069 and (-.065) respectively. Finally, the standard deviations are not large or inconsistent and, thus, support the conclusions reached by this measure.

Median

The median is considered a better measure of central tendency when the distribution(s) are asymmetrical. Therefore, the examination of this measure can provide

Table 10. Measuring the Winsorized mean corporate effective tax rate and standard deviation using a 14-year weighted average.

SIC Code Industry	Overall	Grouped by Sales: Large	Small	Difference
1000-1999 Mining Petroleum Construction	.362 (.086)	.377 (.083)	.308 (.067)	.069 (.016)
2000-2999 Manufacturing Non-Durable	.386 (.064)	.386 (.064)	.399 (.057)	-.013 (.007)
3000-3999 Manufacturing Durable	.388 (.064)	.383 (.064)	.390 (.062)	-.007 (.002)
4000-4999 Communication Shipping Airline	.265 (.038)	.264 (.038)	.282 (.054)	-.018 (-.016)
5000-5999 Trade	.370 (.075)	.358 (.075)	.423 (.037)	-.065 (.038)
Total	.349 (.080)	.349 (.080)	.364 (.077)	-.015 (.003)

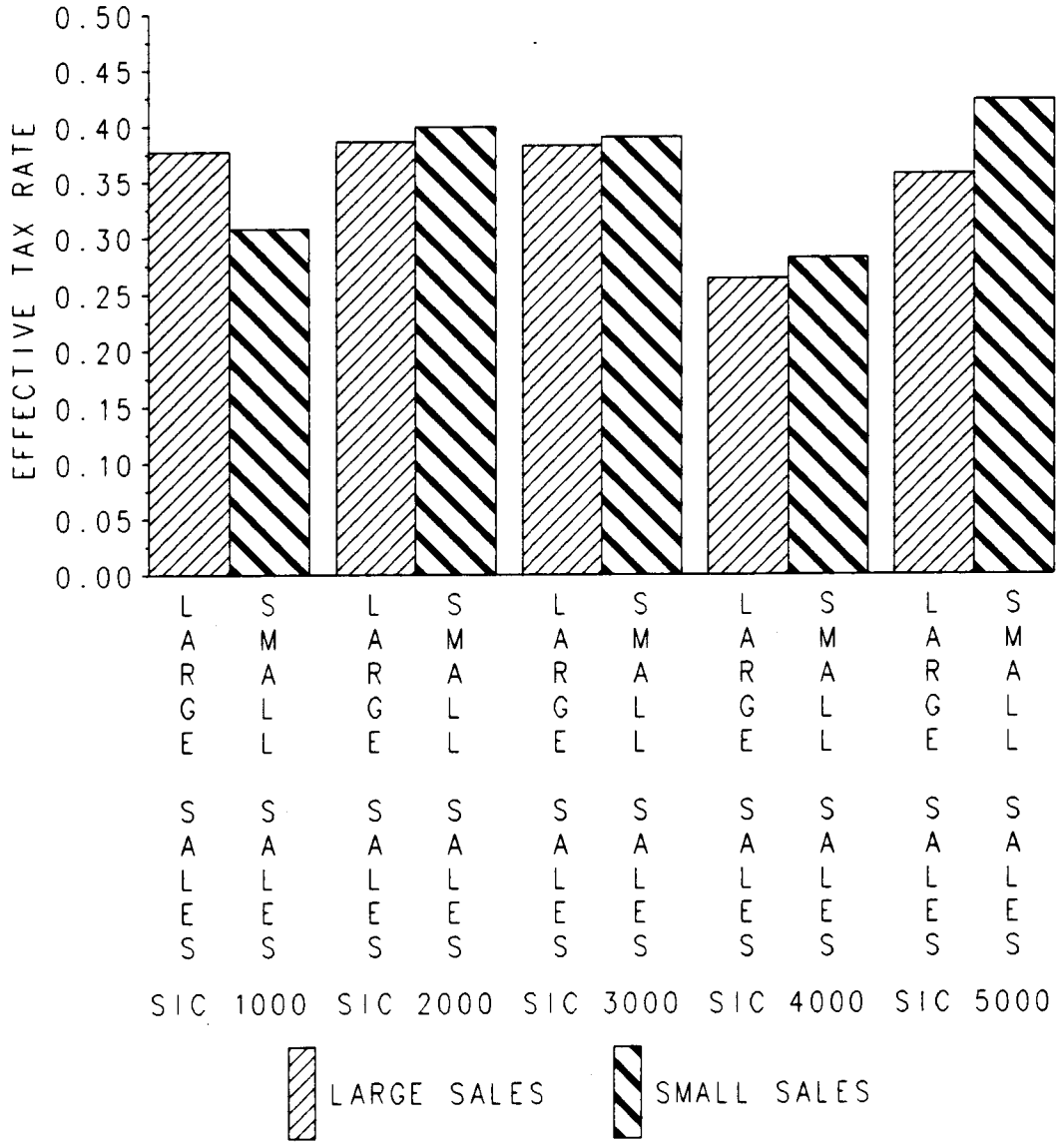


Figure 10. Comparison of effective tax rates by sales and industry using a 14-year weighted Winsorized average (see Table 10).

guidance as to the distribution of corporate effective tax rates. Specifically, this measure can be used to support the conclusions reached by the unweighted mean. If the distribution is symmetrical then the results shown in Table 11 should be consistent with the results in Table 5.

For the most part, the conclusions reached with the unweighted average are the same as the median. That is, the hypothesis that all industry means are equal is rejected; the hypothesis that both sales groups are equal is rejected; and all within industry comparisons, except for SIC 3000-3999, are rejected. However, the difference between sales groups for SIC 2000-2999 and SIC 5000-5999 is not as large as with the unweighted measure.

Based on the above findings, one can conclude that with the exception of SIC 3000-3999, the distribution of ETR's is fairly symmetric. However, as with the unweighted measure, the standard deviations between sales groups and across industry is large and inconsistent.

Yearly Results

In addition to calculating a 14-year effective tax rate, the study also examined corporate effective tax rates, on a yearly basis using a weighted average approach. As the median is used to support the conclusions discussed in the unweighted section, examining ETR's on yearly basis can help verify the conclusions

Table 11. Measuring the median corporate effective tax rate.

SIC Code Industry	Overall	Grouped by Sales Large	Small	Difference
1000-1999 Mining Petroleum Construction	.303	.329	.243	.086
2000-2999 Manufacturing Non-Durable	.397	.364	.419	-.055
3000-3999 Manufacturing Durable	.411	.406	.417	-.011
4000-4999 Communication Shipping Airline	.171	.157	.216	-.059
5000-5999 Trade	.416	.399	.440	-.041
Total	.380	.353	.402	-.049

reached in the weighted section. The results of this analysis are presented in Table 12 and displayed in graph form in Figures 11 through 15.

With the exception of years 1985 and 1986 in SIC 1000-1999, none of the industries or sales classifications (i.e., large or small) within industry had a negative tax liability or negative aggregate net income (ANI). As Figures 11 through 15 indicate, there is a meaningful difference between large and small sales corporations for SIC 1000-1999, SIC 4000-4999, and SIC 5000-5999, with the latter two groups showing large corporations having a lower ETR and the former showing small corporations having a lower ETR. The yearly results support the conclusions made using the weighted measure. Figures 12 and 13 show that for SIC 2000-2999 and SIC 3000-3999 the relationship between large and small sales firms have not been consistent. Thus, as the weighted measure revealed, there is no difference between large and small firms in these two industries.

Figure 16 reveals, that for the 14 year period examined, the industry relationships (i.e., highest ETR to lowest ETR) have changed. For the first eight years, 1973 to 1980, the industry relationships were consistent. However, from 1982 through 1986, these relationships were not consistent. The reason for this change is that from 1981 through 1986 Congress passed four major pieces of tax

Table 12. Measuring the mean corporate effective tax rate by year using a weighted average.

Year	Overall	Large	Small	Diff.
Sic Code 1000-1999 (Mining, Petroleum and Construction)				
1973	.308	.312	.292	.020
1974	.374	.379	.342	.037
1975	.310	.312	.298	.014
1976	.283	.285	.267	.018
1977	.305	.308	.289	.019
1978	.255	.275	.091	.184
1979	.292	.299	.275	.024
1980	.328	.341	.282	.059
1981	.263	.298	.150	.148
1982	.319	.350	.232	.118
1983	.377	.546	.079	.467
1984	.470	.567	.204	.363
1985	N/A	N/A	.347	---
1986	N/A	N/A	N/A	---

N/A - The effective tax rate could not be computed since total income for the year was negative.

Table 12. (continued)

Year	Overall	Large	Small	Diff.
Sic Code 2000-2999 (Manufacturing Non-Durable)				
1973	.468	.468	.463	.005
1974	.544	.546	.470	.076
1975	.515	.516	.462	.054
1976	.459	.460	.443	.017
1977	.489	.491	.426	.065
1978	.468	.469	.426	.043
1979	.455	.456	.415	.041
1980	.418	.419	.400	.019
1981	.359	.359	.393	-.034
1982	.359	.359	.367	-.008
1983	.397	.397	.396	.001
1984	.388	.388	.393	-.005
1985	.406	.406	.392	.014
1986	.349	.346	.427	-.081

Table 12. (continued)

Year	Overall	Large	Small	Diff.
Sic Code 3000-3999 (Manufacturing Durables)				
1973	.445	.446	.439	.007
1974	.433	.430	.467	-.037
1975	.431	.428	.464	-.036
1976	.440	.440	.443	-.003
1977	.454	.455	.439	.016
1978	.438	.438	.440	-.002
1979	.425	.425	.424	.001
1980	.447	.455	.386	.069
1981	.425	.430	.388	.042
1982	.398	.402	.365	.037
1983	.311	.308	.349	-.041
1984	.344	.342	.367	-.025
1985	.426	.427	.418	.009
1986	.327	.318	.455	-.137

Table 12. (continued)

Year	Overall	Large	Small	Diff.
Sic Code 4000-4999 (Communication, Shipping and Airline)				
1973	.247	.247	.249	-.002
1974	.342	.344	.250	.094
1975	.121	.119	.159	-.040
1976	.130	.127	.201	-.074
1977	.139	.137	.197	-.060
1978	.156	.155	.177	-.022
1979	.114	.112	.179	-.067
1980	.108	.106	.170	-.064
1981	.107	.104	.182	-.078
1982	.078	.077	.169	-.092
1983	.011	.002	.208	-.206
1984	.139	.136	.229	-.093
1985	.124	.120	.209	-.089
1986	.194	.190	.268	-.078

Table 12. (continued)

Year	Overall	Large	Small	Diff.
Sic Code 5000-5999 (Trade)				
1973	.409	.407	.451	-.044
1974	.441	.438	.483	-.045
1975	.456	.455	.478	-.023
1976	.405	.400	.490	-.090
1977	.406	.402	.476	-.074
1978	.436	.434	.468	-.034
1979	.373	.367	.466	-.099
1980	.410	.407	.437	-.030
1981	.360	.355	.443	-.088
1982	.316	.309	.415	-.106
1983	.318	.311	.406	-.095
1984	.301	.290	.416	-.126
1985	.327	.321	.423	-.102
1986	.365	.358	.467	-.109

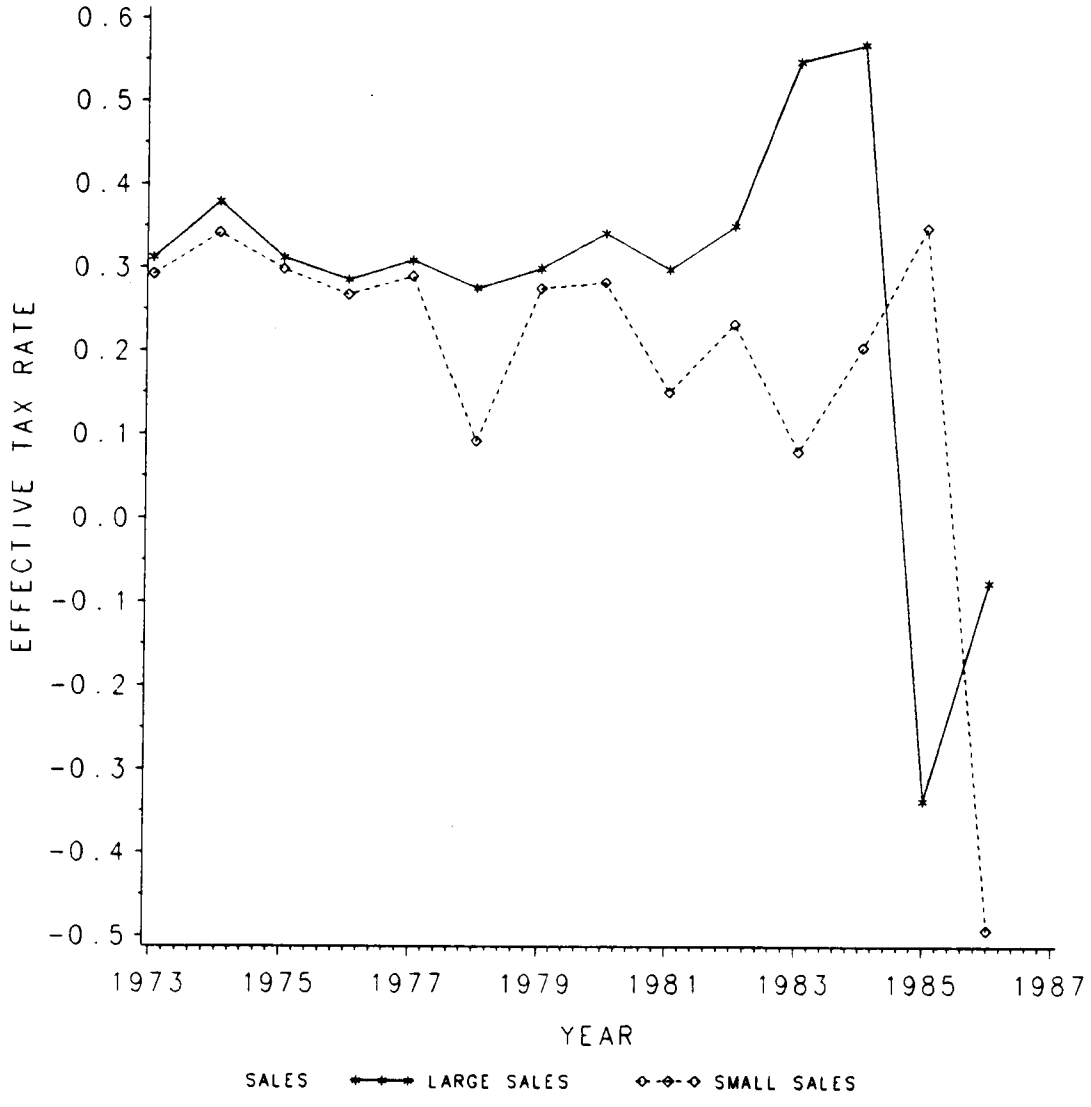


Figure 11. Comparison of effective tax rates from 1973-1986 by sales classification for SIC 1000-1999 using a weighted average (see Table 12).

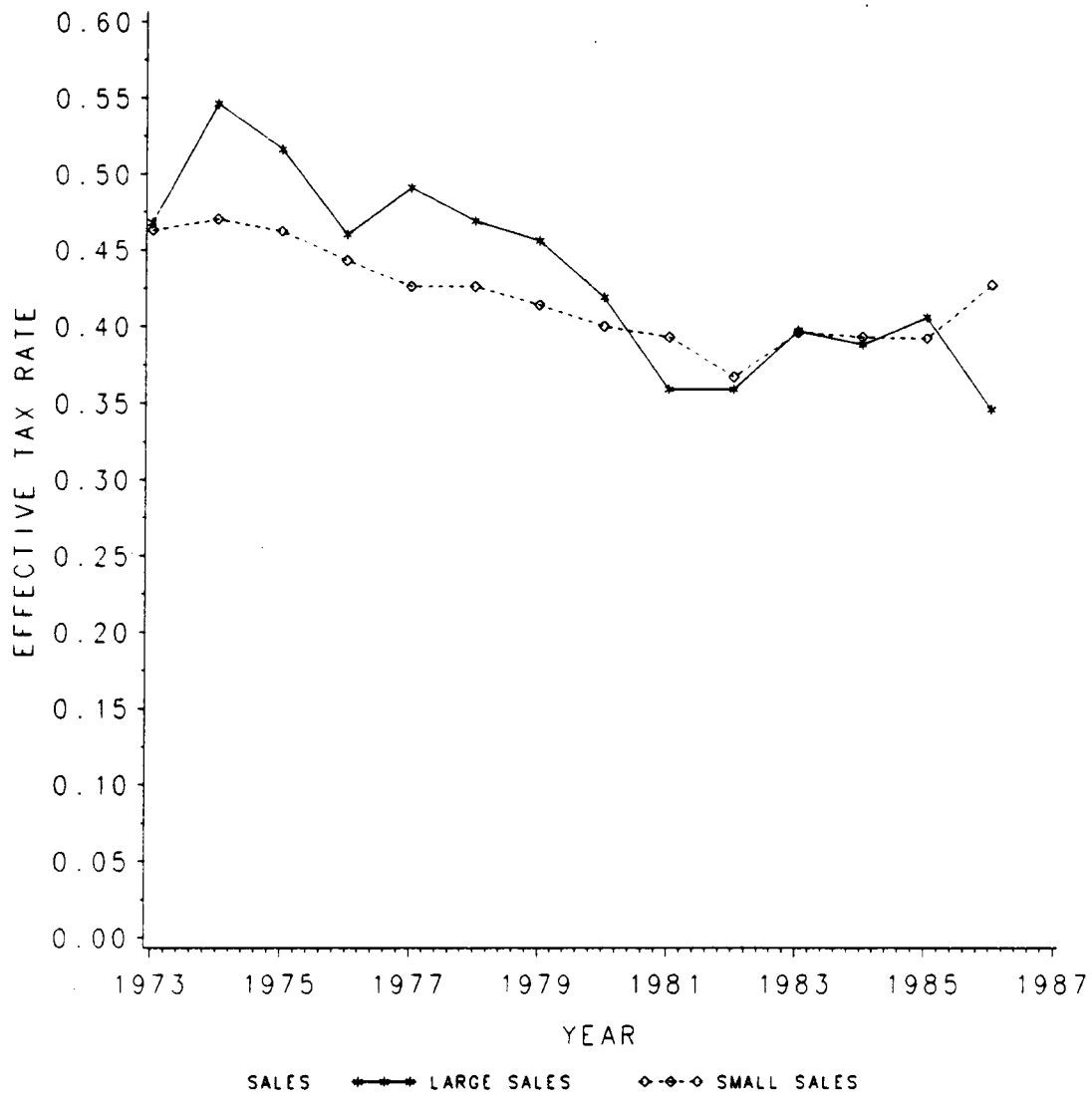


Figure 12. Comparison of effective tax rates from 1973-1986 by sales classification for SIC 2000-2999 using a weighted average (see Table 12).

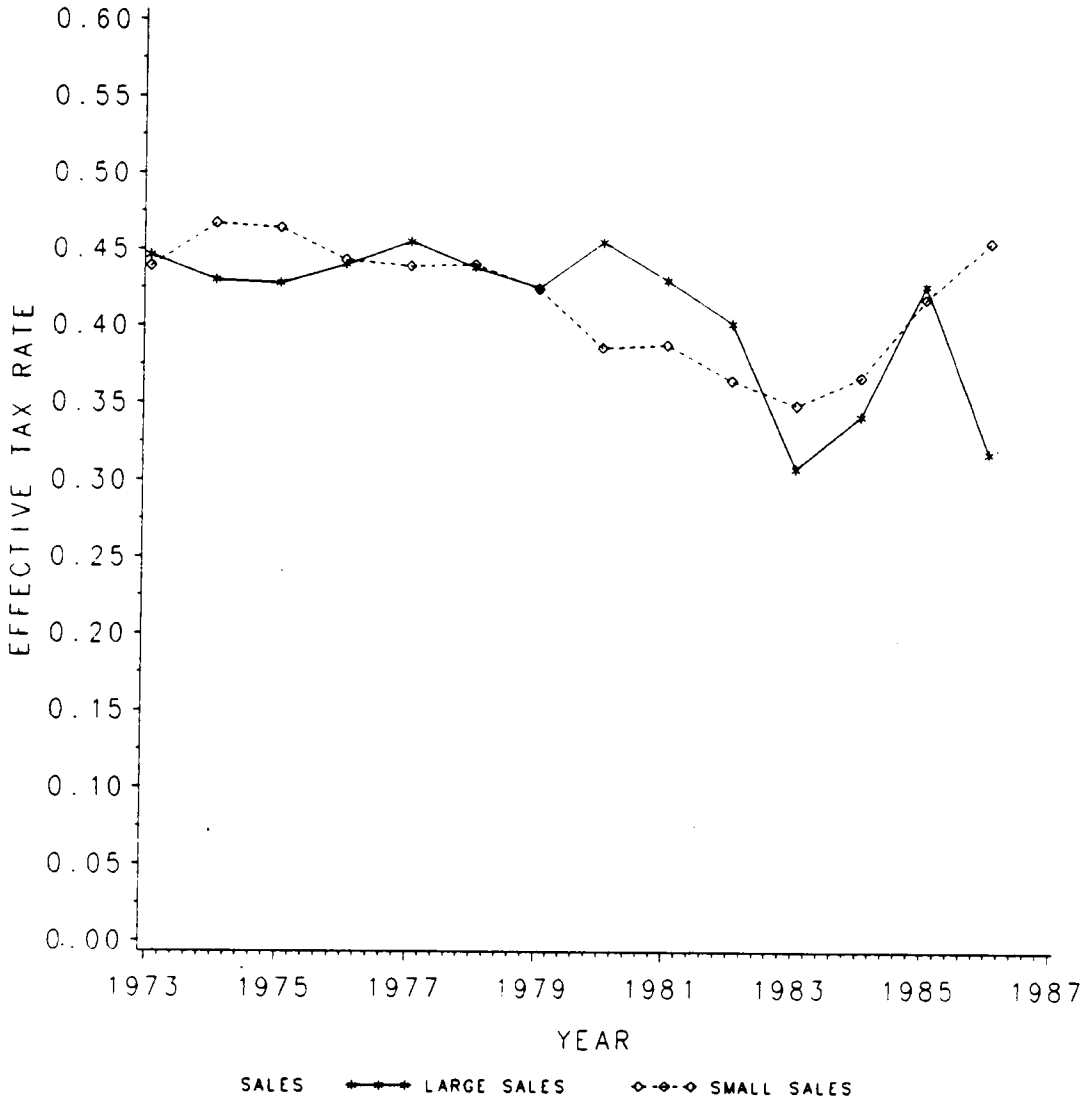


Figure 13. Comparison of effective tax rates from 1973-1986 by sales classification for SIC 3000-3999 using a weighted average (see Table 12).

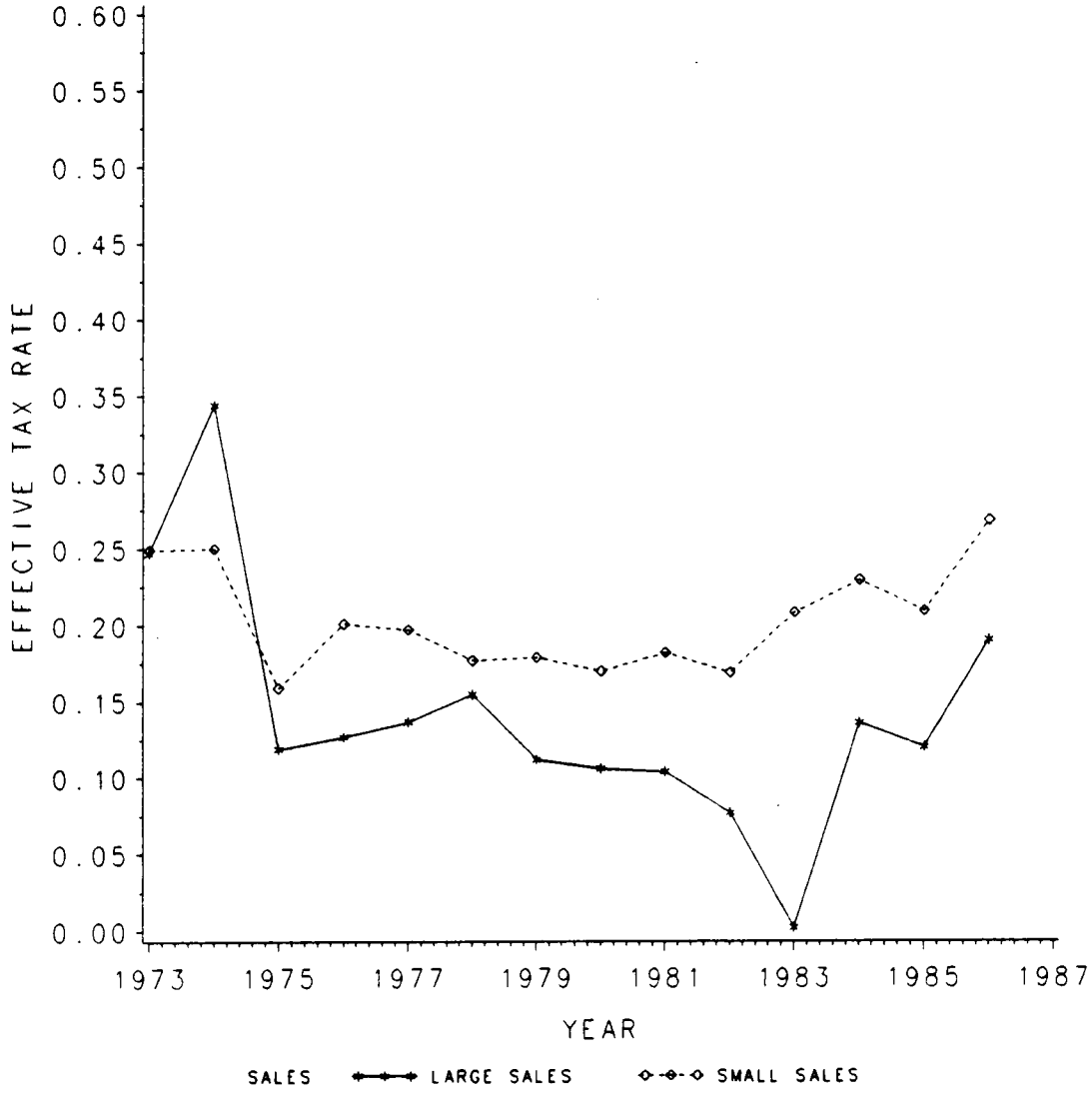


Figure 14. Comparison of effective tax rates from 1973-1986 by sales classification for SIC 4000-4999 using a weighted average (see Table 12).

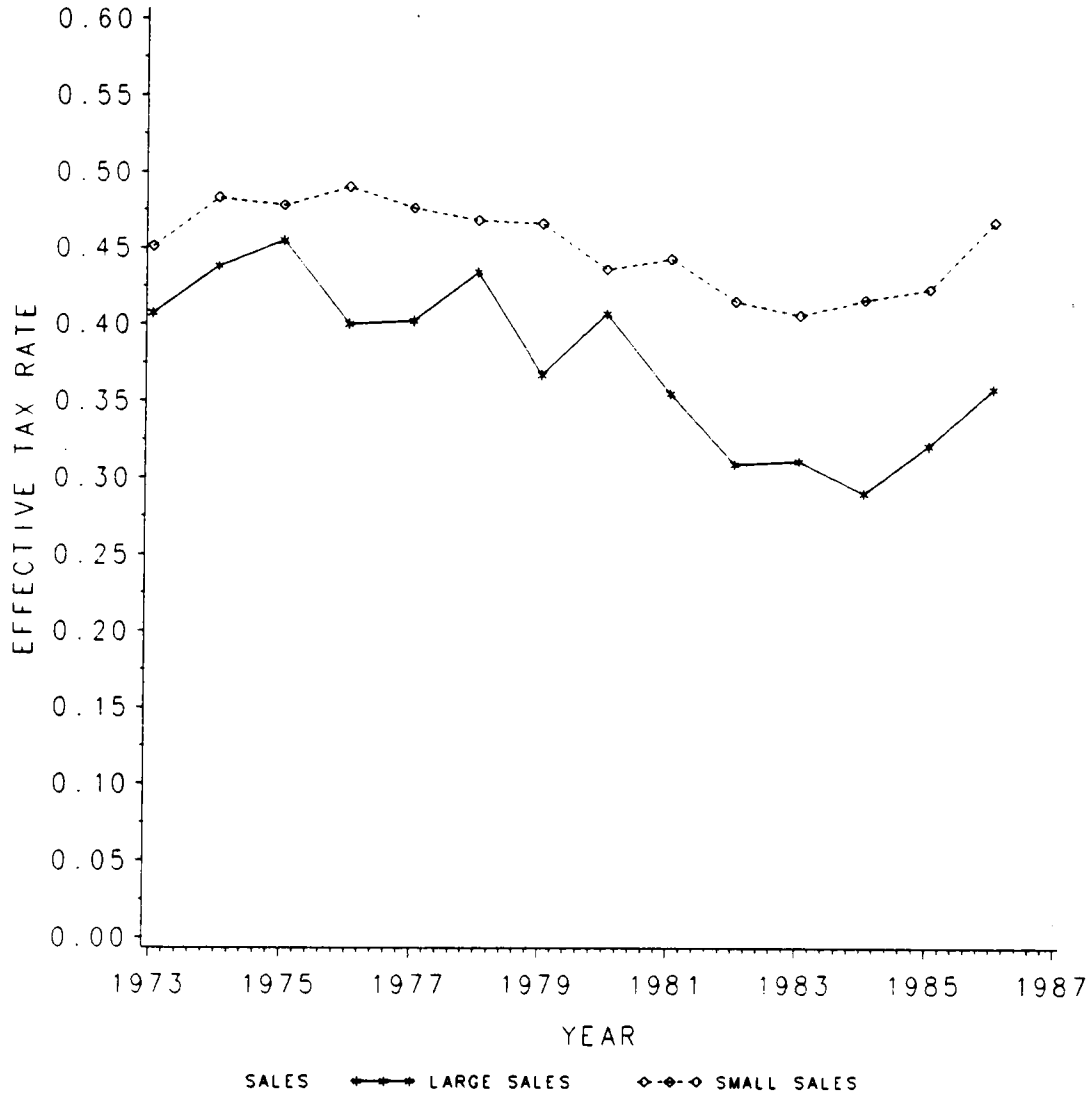


Figure 15. Comparison of effective tax rates from 1973-1986 by sales classification for SIC 5000-5999 using a weighted average (see Table 12).

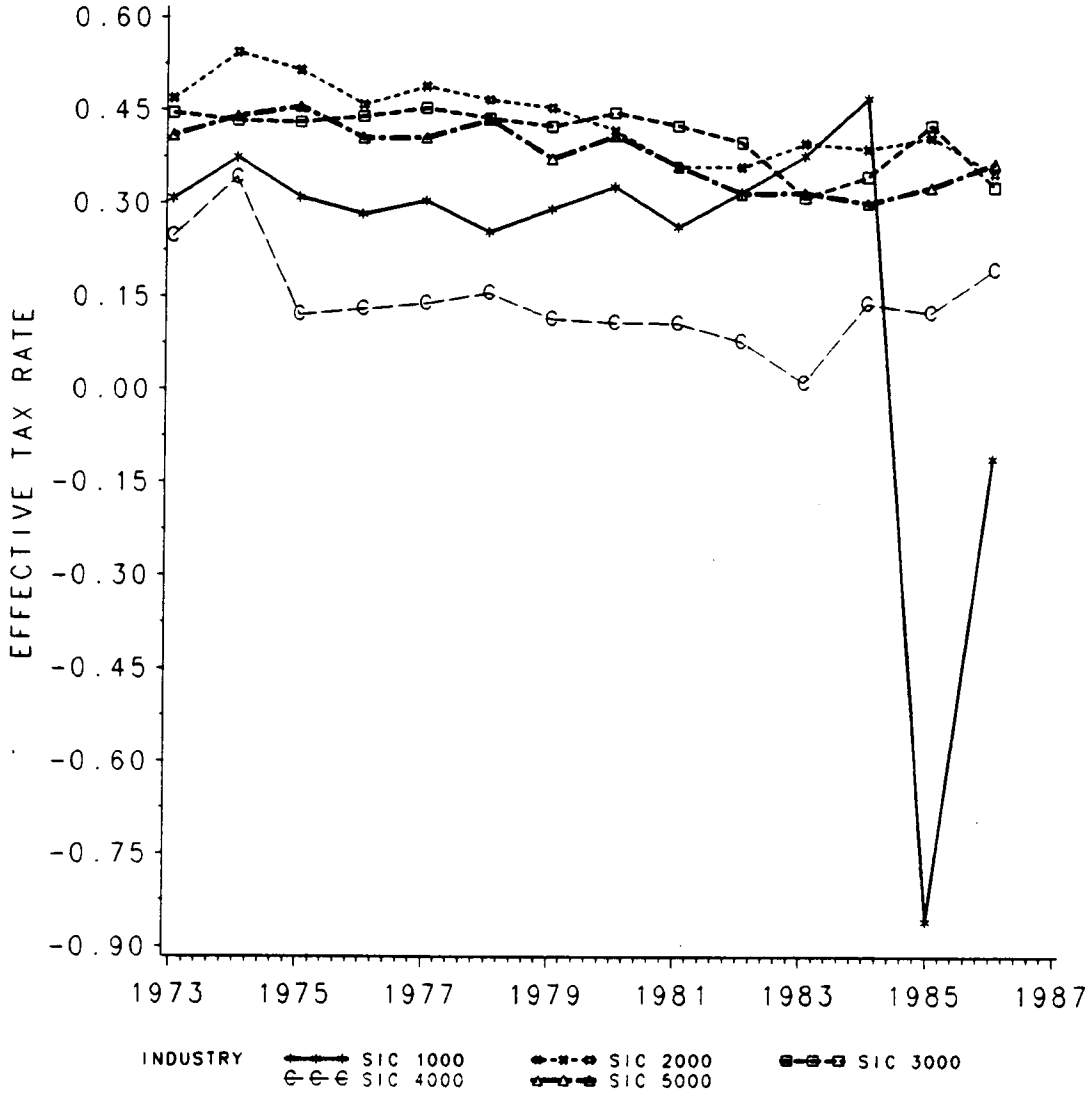


Figure 16. Comparison of overall effective tax rates from 1973-1986 by industry classification using a weighted average (see Table 12).

legislation each with conflicting goals and objectives. Therefore, as Figure 16 indicates examining ETR's on a yearly basis, rather then longitudinally, does not provide an accurate portrayal of the tax burden each industry faces.

Zimmerman's Size Hypothesis

As discussed in Chapter 4, Zimmerman posed that the larger the size of a firm, the greater the public scrutiny it faces. He contended that public scrutiny leads to increased political costs (e.g., regulation and taxes). Therefore, he hypothesized that larger firms, which he defined as the top 50 firms out of the 450 firms he examined, will have higher ETR's than smaller firms. Accordingly, this study examines the fifty largest firms and tests Zimmerman's hypothesis using both the weighted and unweighted measures.

The weighted measure revealed that large firms have a mean effective tax rate of .340 while small firms have a mean ETR of .403. This difference (.063) is meaningful and conflicts with Zimmerman's notion that large firms have greater ETR's than small firms.

However, when examining his hypothesis using the unweighted measure, the results support Zimmerman's contention that large firms have higher ETR's than small firms. Using this measure, the large firms have a mean

ETR of .382 while small firms have a mean ETR of .290. The difference between these two groups is .092 and is meaningful. Consequently, the results indicate that the measure used (i.e., weighted, unweighted) can have an impact on the researchers conclusions.

Conclusions

Table 13 sets forth effective tax rates for all the measures examined in this phase of the study. The hypothesis that size, as measured by sales, is a factor in distinguishing a firms ETR is only rejected using the unweighted and median measures of central tendency. The importance of this finding is that the measure used (i.e., unweighted versus weighted) has a significant impact on the conclusions reached by the researcher. This notion is further supported in examining Zimmerman's size hypothesis. When using either the unweighted or weighted measure this study found that there is a meaningful difference between large and small firms. However, the unweighted measure indicated that smaller firms have higher ETR's than large firms, opposite of what Zimmerman hypothesized. Conversely, the weighted measure found that large firms have higher ETR's than small firms, a result consistent with his hypothesis.

The inconsistency between the weighted and unweighted measures is attributable to the unweighted measure not

Table 13. Recapitulation of measures of central tendency for Phase I.

SIC CODE Industry	Unweighted	Weighted	Unweighted Trimmed	Weighted Trimmed	Unweighted Winsorized	Weighted Winsorized	Median
OVERALL							
LARGE							
SMALL							
1000-1999	.312	.350	.340	.342	.329	.362	.303
Mining	.363	.382	.328	.337	.345	.377	.329
Petroleum	.280	.244	.349	.353	.318	.308	.243
Construction							
2000-2999	.395	.425	.372	.366	.373	.386	.397
Manufacturing	.351	.425	.363	.365	.358	.386	.364
Non-Durable	.447	.412	.382	.387	.392	.399	.419
3000-3999	.523	.406	.374	.378	.387	.388	.411
Manufacturing	.430	.405	.377	.378	.383	.383	.406
Durable	.578	.411	.372	.376	.389	.390	.417
4000-4999	.176	.133	.334	.346	.274	.265	.171
Communication	.156	.130	.338	.347	.268	.264	.157
Shipping	.220	.204	.330	.336	.286	.282	.216
Airline							
5000-5999	.423	.362	.389	.375	.393	.370	.416
Trade	.389	.357	.382	.373	.379	.358	.399
	.467	.442	.399	.406	.411	.423	.440
Overall Total	.400	.333	.371	.368	.360	.349	.380
Large Total	.329	.332	.368	.368	.345	.349	.353
Small Total	.472	.353	.374	.376	.375	.364	.402

considering the effect of firm size whereas, the weighted measure does consider the effect of size. Therefore, the smaller firms in the study have a higher proportion of firms with large ETR's (e.g., ETR's greater than 1.00) than large firms. These higher ETR's affect the unweighted measure but not the weighted measure. Because the results provide conflicting results, it is important that future tax policy decisions be reached after examining ETR's on both a weighted and unweighted basis.

The hypothesis that all industry groups have equal effective tax rates is rejected for all measures except the trimmed weighted average. While the trimmed and Winsorized measures revealed a more consistent ETR across industries, all of the measures, except for the one noted, indicate that there is a meaningful difference among industries. In addition, Table 12 indicates that across measures, SIC 4000-4999 have the lowest ETR while the manufacturing durables industry (SIC 3000-3999) have the largest ETR.

Finally, Figure 16 depicts the need to examine effective tax rates on a longitudinal and not yearly basis. The effect of Congress' annual changes in the tax law are readily apparent. Since 1981, with the exception of SIC 4000-4999 which has many corporations that are engaged in government contracts or subject to government

regulations, corporate effective tax rates across industry have become extremely volatile.

PHASE II

The second phase of the study attempted to determine whether corporate effective tax rates are progressive, regressive, or proportional. Specifically, as a given financial characteristic increases, do corporate effective tax rates change? In addressing this question two different methods were employed. The first method examined this question on a company-by-company basis. For each company the weighted average ETR was plotted against the 14-year average of the financial characteristic being examined to determine the relationship between the two variables. The second method divided the corporations into quartiles based on the 14-year average of the financial characteristic being examined. Next, the effective tax rate for each group was calculated using both a weighted and unweighted approach. These group rates were plotted to determine if corporate effective tax rates are progressive, regressive, or proportional. Accordingly, the following discussion is in two parts. The first discusses the results of the company-by-company approach and the second part presents the results of the group-by-group approach.

Method 1 (Company by Company)

As discussed above, the first step of this method was to plot ETR by the 14-year average of the financial characteristic being examined. The results of this procedure reveal that no discernible relationship existed between ETR and any of the financial characteristics. Both Neter Wasserman and Kuetner (NWK) [1985] and Kleinbaum and Kupper (K&K) [1978] suggest transforming the variables when the data suggests a non-linear model. K&K [1978, p. 242] set forth the following transformations and the situations where they are most useful:

> (1) Log transformation should be used when the relationship between y and x suggests a constantly increasing slope.
>
> (2) Reciprocal transformation should be used to minimize the effect of large y variables.
>
> (3) Square transformation should be used when the original relationship is curvilinear downward.
>
> (4) Square root transformation should be used when the original relationship is curvilinear upward.

While these procedures are helpful in transforming data which exhibit the aforementioned tendencies, as mention previously, there did not exist a discernible relationship between any of the financial characteristics and ETR.

Nevertheless, to ensure that this was true, the transformations suggested by K&K were used on both the independent and the dependent variables. The SAS procedure PROC CORR was performed on both the original and

transformed variables. This analysis suggests that the square root of the effective tax rate is correlated with the square root of each independent variable and the untransformed ETR is correlated with the log of each of the independent variables. Next, simple regression was run to determine if the R^2 of any of these models is significant. The results revealed that none of the models using the transformed data produced an R^2 greater than .06. Accordingly, the study concluded that on a company-by-company basis, no discernible relationship exists between the financial characteristics examined and ETR.

Method 2 (By Group)

The second method grouped the corporations into four quartiles. The quartiles are based on the 14-year average of each financial characteristic. Quartile 1 represents the smallest corporations with respect to the financial characteristic examined, while Quartile 4 represents the largest corporations. Since each financial characteristic is considered separately, it is possible that a company could be ranked in Quartile 2 for assets and Quartile 3 for sales. The dependent variable, ETR, was measured using both a 14-year weighted and unweighted approach. Table 14 presents the results for the five financial characteristics examined.

Table 14. Measuring whether the size of corporate financial characteristics impact the mean corporate effective tax rate and standard deviation when using a 14-year weighted and unweighted average.

Group	In Millions	Weighted	Unweighted
SALES			
1	< 84.86	.369 (.183)	.510 (1.25)
2	84.86 - 252.41	.343 (.176)	.421 (.605)
3	252.42 - 850.73	.280 (.167)	.310 (.174)
4	> 850.73	.338 (.185)	.337 (.279)
ASSETS			
1	< 60.41	.415 (.124)	.531 (1.23)
2	60.41 - 188.49	.394 (.160)	.427 (.638)
3	188.50 - 865.16	.340 (.145)	.319 (.176)
4	> 865.16	.328 (.189)	.301 (.279)

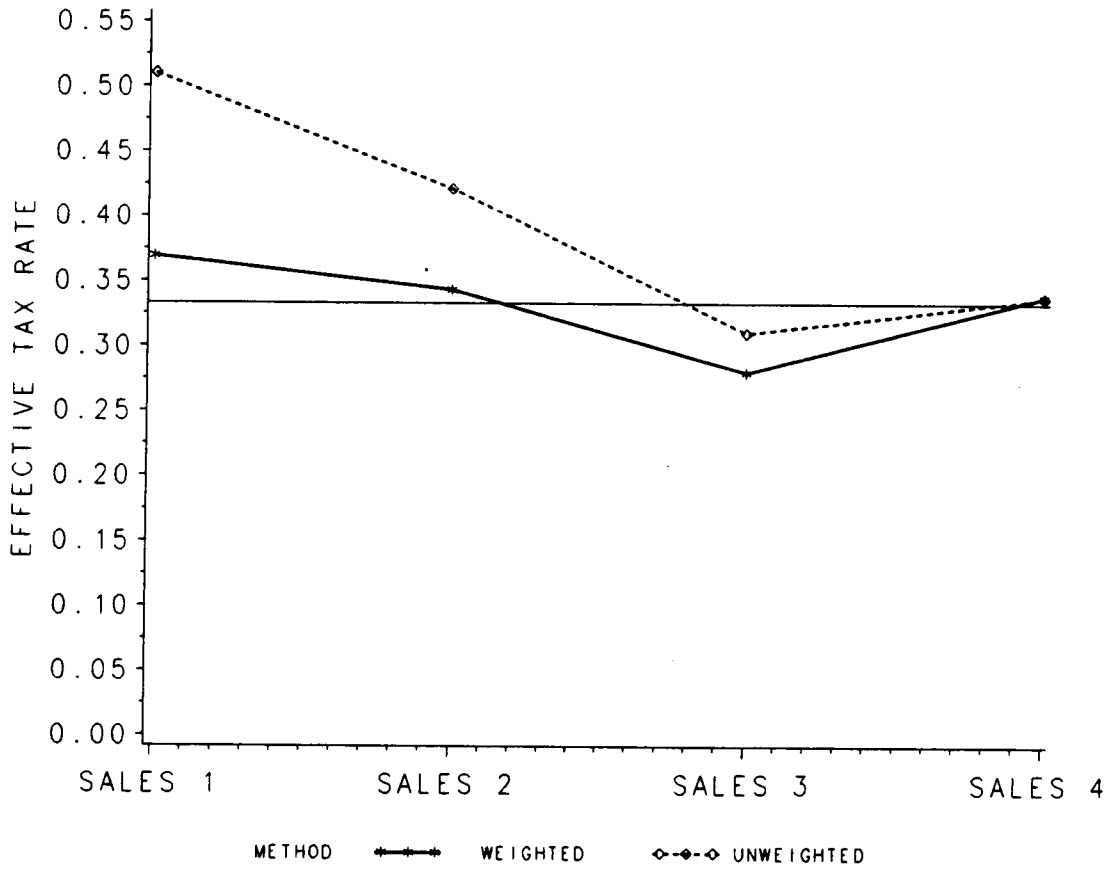
Table 14. (continued)

Group	In Millions	Weighted	Unweighted
INCOME			
1	< 5.25	.427 (.393)	.584 (1.38)
2	5.25 - 19.01	.352 (.224)	.356 (.198)
3	19.02 - 72.71	.328 (.165)	.344 (.174)
4	> 72.71	.332 (.182)	.294 (.161)
CAPITAL EXPENDITURES			
1	< .8950	.559 (.215)	.559 (1.24)
2	.8950 - 6.25	.417 (.134)	.450 (.615)
3	6.26 - 40.85	.361 (.119)	.304 (.205)
4	> 40.85	.313 (.187)	.266 (.221)
DEBT-TO-EQUITY			
1	< .0981	.338 (.110)	.337 (.157)
2	.0981 - .1844	.265 (.175)	.369 (.225)
3	.1845 - .3044	.353 (.205)	.329 (.309)
4	> .3044	.361 (.171)	.543 (1.36)

Sales

A graphic representation of the relationship between sales and ETR is found in Figure 17. The solid horizontal line represents the ETR for all companies using a weighted average approach and serves as a benchmark for determining whether the tax system is progressive, regressive, or proportional for the given financial characteristic, in this case sales. If the tax system is progressive with respect to a financial characteristic, the lines with symbols should be upward sloping. If the tax system is regressive with respect to the financial characteristic, the lines would be downward sloping. Finally, if the tax system is proportional, the lines would be parallel to the benchmark line.

The results indicate that the tax system with respect to sales is partially regressive. That is, except for Group 4, using either a weighted or unweighted approach, ETR is lower as sales became larger. The study's null hypothesis that all four groups would have equal ETR is rejected for both methods. The results of this study are somewhat different than Porcano [1986]. He found that ETR is regressive for all four quartiles while this study found that ETR was regressive only through the first three quartiles. A possible reason for this discrepancy is that while this study included worldwide taxes (i.e., federal, state and foreign) in the calculation of ETR, Porcano only



SALES (IN MILLIONS)

SALES 1: SALES < 84.86
SALES 2: 84.87 < SALES < 252.41
SALES 3: 252.41 < SALES < 850.73
SALES 4: SALES > 850.73

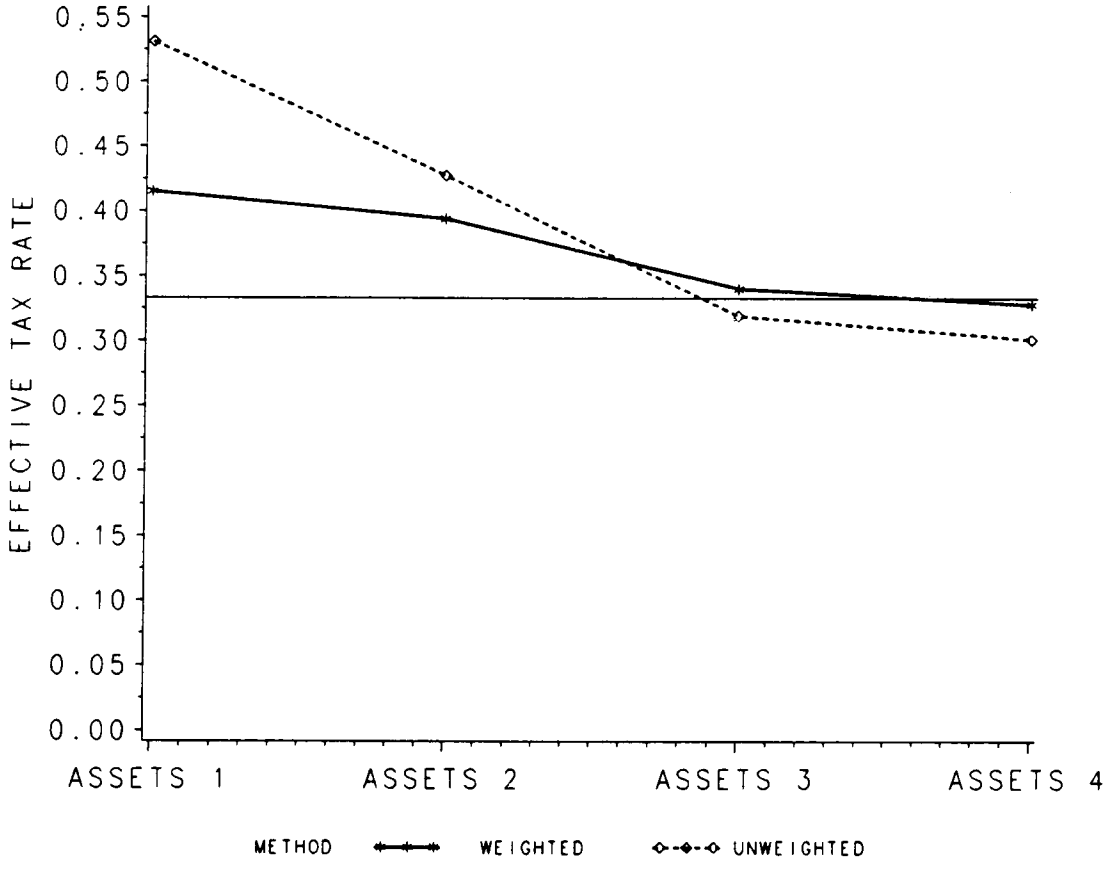
Figure 17. Comparison of effective tax rates by sales size using both a 14-year weighted and unweighted average (see Table 14).

included U.S. taxes (i.e., federal and state) in his ETR calculation. In addition, the results of this study do not support the notion advanced by Zimmerman [1983] that large firms have greater political costs and, thus, have the highest ETR.

Assets

The relationship between assets and ETR is shown in Figure 18. Over the first three quartiles the unweighted approach reflects a constant regressive relationship between ETR and assets. The downward change between ETR and each asset group (i.e., Group 1 to 2 and 2 to 3) is approximately 11 percent. While the change in ETR between Group 3 and Group 4 continues the regressive trend, the difference is only 1.8%. The weighted method also reveals a regressive trend, but this overall trend is not as sharp as with the unweighted method. The difference between the smallest firms (Group 1) and the largest firms (Group 4) is only 8.5%, with a large portion of this difference found between Groups 2 and 3.

Overall, regardless of the method employed, the hypothesis that the groups have equal ETR is rejected. The results of this variable are consistent with the theories espoused by Siegfried [1972] and Porcano [1986].



ASSETS (IN MILLIONS)

ASSETS 1: ASSETS < 60.41
ASSETS 2: 60.41 < ASSETS < 188.49
ASSETS 3: 188.49 < ASSETS < 865.16
ASSETS 4: ASSETS > 865.16

Figure 18. Comparison of effective tax rates by asset size using both a 14-year weighted and unweighted average (see Table 14).

The researchers concluded that larger firms are able to reduce their taxes because:

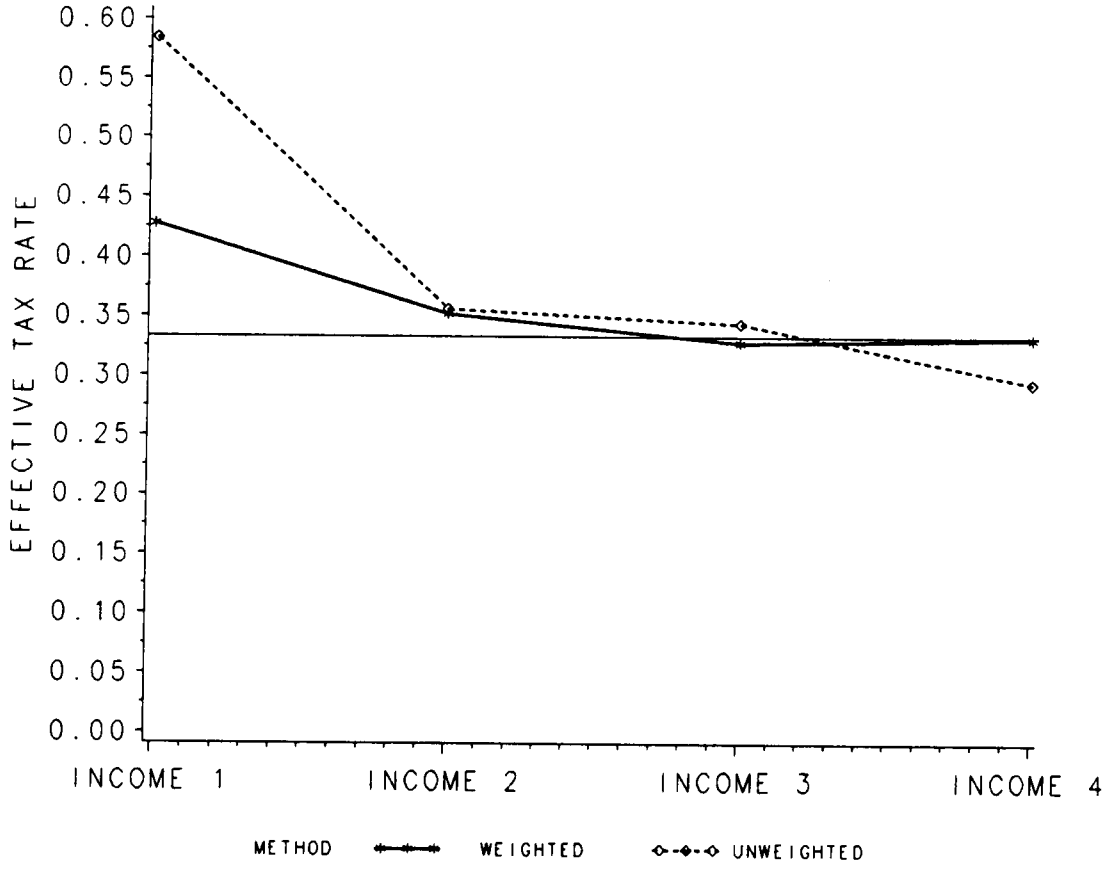
> (1) They have greater resources to develop or pay for tax expertise.
>
> (2) They have the resources to influence the political process.
>
> (3) They have greater resources which enable them to organize their activities to minimize taxes.

While the results of this study are generally consistent with Porcano, one exception should be noted. Porcano found that the largest decrease in ETR occurred between quartiles 3 and 4, while this study found these two quartiles have the smallest change.

Income

Figure 19 depicts the graphical relationship between ETR and income. The unweighted approach reveals that the smallest firms, with respect to income, have the highest ETR's (.584) and the largest firms (.294) have the lowest ETR. Further, the graph illustrates that their is no difference between the ETR's of Groups 2 and 3.

The weighted approach yielded a different result. As with the unweighted approach, Group 1 has the largest ETR, but unlike the unweighted approach, the other three groups (2, 3, 4) have approximately the same ETR's. Thus, with the exception of Group 1, the relationship between income and ETR is proportional. Because of the impact of Group 1, using either method, the hypothesis that all four



INCOME (IN MILLIONS)

INCOME 1: INCOME < 5.25
INCOME 2: 5.25 < INCOME < 19.01
INCOME 3: 19.01 < INCOME < 72.71
INCOME 4: INCOME > 72.71

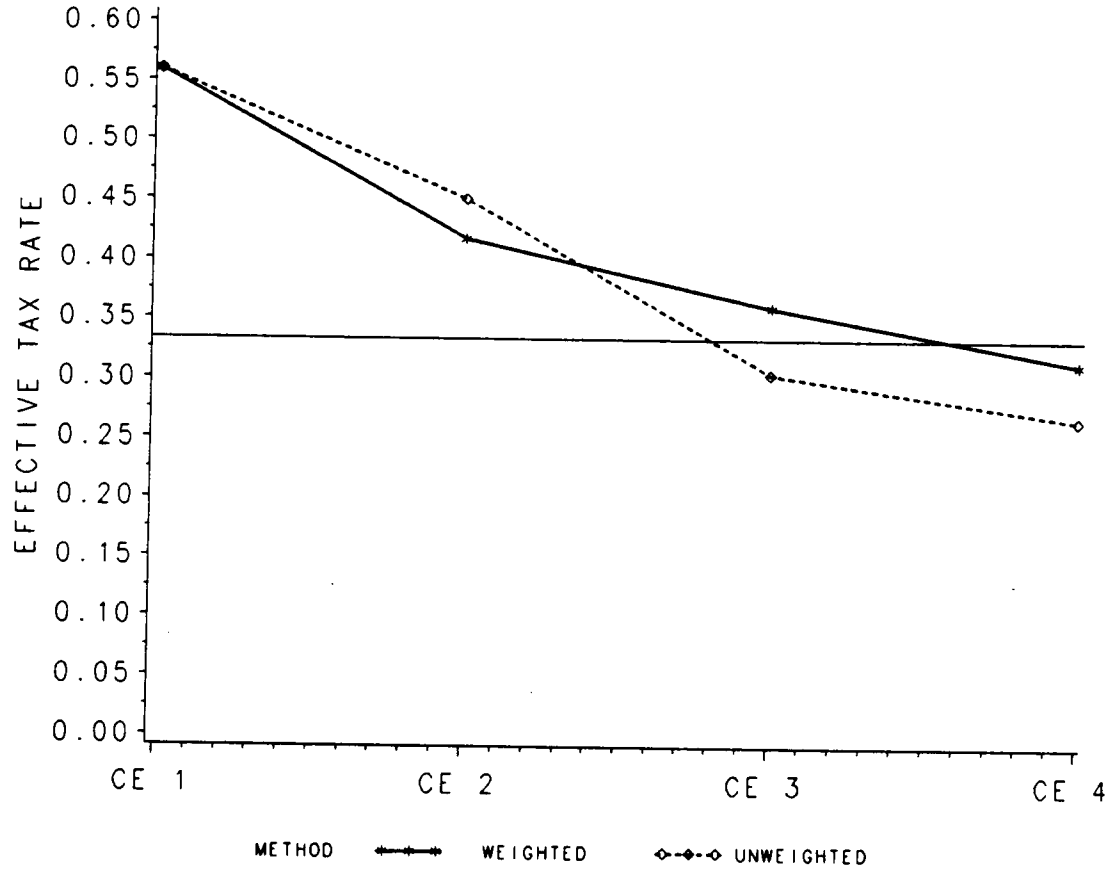
Figure 19. Comparison of effective tax rates with size of income using both a 14-year weighted and unweighted average (see Table 14).

groups have equal ETR is rejected. Although the results are consistent with Porcano [1986], the fact that the tax system is proportional with respect to income is contrary to the researcher's expectations.

Capital Expenditures

The relationship between capital expenditures and ETR is displayed in Figure 20. Prior to 1987, corporations which made capital expenditures were entitled to an investment tax credit (ITC). In addition, corporations which incur capital expenditures are allowed to write-off this investment over a period of time. Therefore, corporations which have more capital expenditures should have a lower ETR. As the figure depicts, using either a weighted or unweighted approach, the larger the firm's capital expenditure the smaller its effective tax rate.

Although Congress intended to provide tax incentives to corporations, this researcher believes that Congress envisioned that, over time, these capital incentives would be offset with increases in corporate income and, thus, an increase in tax revenue. Therefore, the results of a longitudinal study should not reveal a negatively sloping relationship between ETR and capital expenditures. However, as the results indicate corporations that do make large capital expenditures enjoy the tax benefits of these expenditures over a long period of time.



CAPITAL EXPENDITURES (IN MILLIONS)

CAPITAL EXP. 1: CAPITAL EXP. < .895
CAPITAL EXP. 2: .895 < CAPITAL EXP. < 6.25
CAPITAL EXP. 2: 6.250 < CAPITAL EXP. < 40.85
CAPITAL EXP. 4: CAPITAL EXP. > 40.85

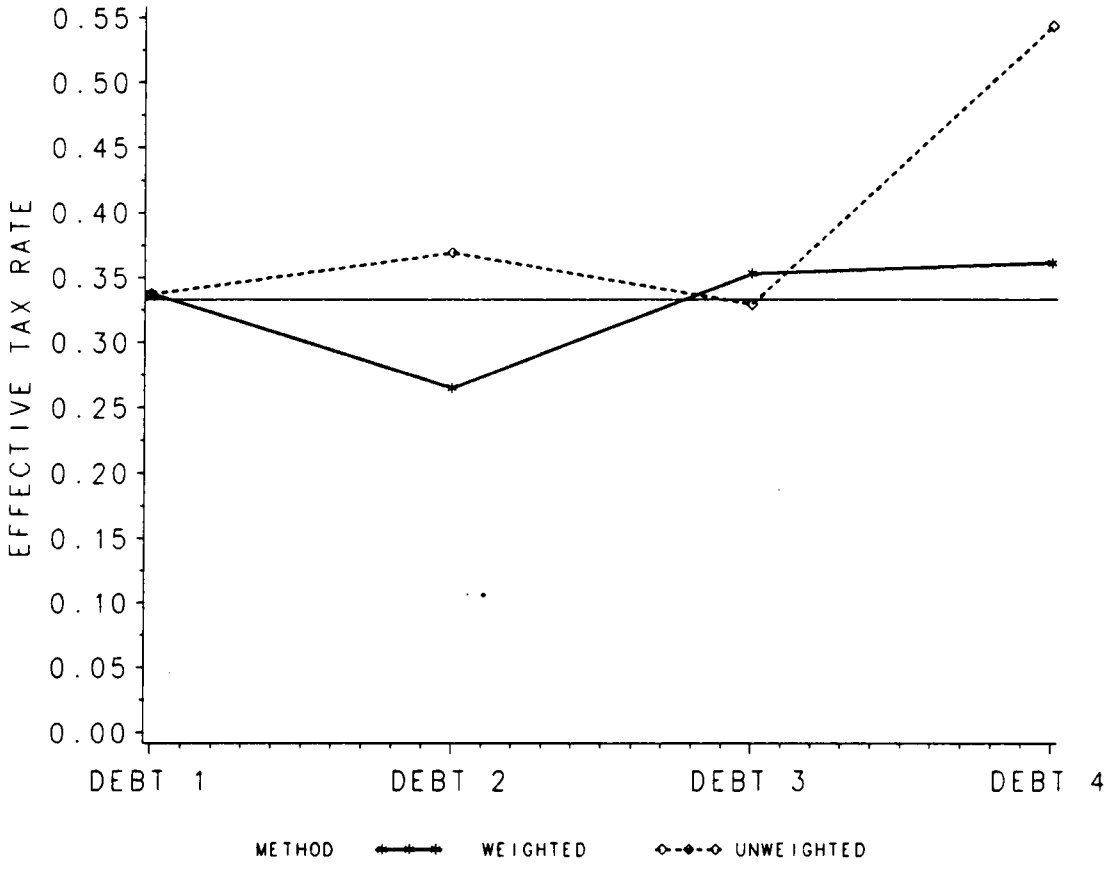
Figure 20. Comparison of effective tax rates with size of capital expenditures using both a 14-year weighted and unweighted average (see Table 14).

In summary, the figure reveals that regardless of the method employed, the hypothesis that all four groups have equal ETR's is rejected. These results are inconsistent with Porcano's [1986], who found that firms with the smallest capital expenditures also had the smallest ETR's.

Debt to Equity

Figure 21 reveals the relationship between a firm's debt-to-equity ratio and its ETR. The figure indicates that the relationship between these two variables is impossible to determine. While the Porcano 1986 study did not examine the relationship between these two variables, the relationship between these two variables was examined by Stickney and McGee [1982]. They also found that there is no relationship between debt-to-equity and ETR. Since interest on debt is a tax deduction whereas the payment of dividends on corporate stock is not tax deductible theoretically, the higher a firm's debt-to-equity ratio the lower its effective tax rate.

Using either method, the hypothesis that all the groups have the same ETR is rejected. Further, a surprising result of this study is that the group with the highest debt-to-equity ratio has the highest effective tax rate.



DEBT TO EQUITY RATIO

DEBT TO EQ. 1: DEBT TO EQ. < .098
DEBT TO EQ. 2: .098 < DEBT TO EQ. < .184
DEBT TO EQ. 2: .184 < DEBT TO EQ. < .304
DEBT TO EQ. 4: DEBT TO EQ. > .304

Figure 21. Comparison of effective tax rates with size of debt-to-equity using both a 14-year weighted and unweighted average (see Table 14).

Conclusions

Generally, the results of examining these five financial characteristics are consistent with Porcano [1986]. Unlike Porcano, who found ETR regressive across all sales groups, this study found that ETR was regressive only over the first three groups. The study did find that for assets, especially for the unweighted measure, ETR was regressive across all four groups.

The results of examining the income variable indicate that the relationship between ETR and a corporation's book income, with the exception of small firms, is proportional or possibly regressive. Thus, the results seem to indicate that Congress was correct in requiring a corporation to include a portion of its book income when computing its alternative minimum tax liability.

With respect to capital expenditures, the study's findings are consistent with the researcher's expectations. That is, on average, the larger a corporation's capital expenditures, the smaller its effective tax rate. Thus, over time a corporation with large capital expenditures does not appear to generate enough income to mitigate these tax incentives.

Finally, the study found that a corporation's debt to equity ratio bears no relationship to its ETR. Surprisingly, the results with the unweighted measure indicate that the group with the highest debt-to-equity

ratio has the highest effective tax rate. The results appear to indicate that, on average, highly leveraged firms do not have lower effective tax rates.

PHASE III

The third phase of the study examined whether various financial characteristics could predict a corporation's current tax rate (CTR). The financial characteristics examined were modified book income deflated by sales; modified book income deflated by total assets; debt-to-equity ratio; capital expenditures deflated by modified book income; 1985 net plant, property, and equipment to 1985 gross plant, property, and equipment; foreign operations; industry; and inventory method. The rationale for selecting each of these characteristics and the hypothesized relationship between CTR and these variables was set forth in Chapter 4 (see Figure 5).

Stepwise regression was used to ascertain whether these financial characteristics could predict CTR. Proper utilization of this technique, when the primary goal of the research is prediction, requires that the data be separated into two groups with the first group serving as the estimation group and the second group (holdout group) being used as the prediction group. To form the two groups, a computer program was used to randomly assign each corporation a number. The corporations were then

divided into two groups based on the median of all numbers assigned. In other words, all the corporations with a number greater than the median were assigned to the estimation group and all the corporations with a number below or equal to the median were assigned to the prediction group.

The data were analyzed using the SAS PROC STEPWISE procedure. This procedure provides three different methods for developing the estimation model: the forward, backward, and stepwise procedure. All three procedures were used, and all three produced the same results. Therefore, only the results of the forward procedure are presented. The forward procedure enters the most significant variable first, and then subsequent variables are entered into the model if they are significant. Once the variable is entered into the model, it is not removed.

Table 15 reveals that the first variable to enter the model is capital expenditures deflated by income. This is not surprising since this variable affects a corporation's CTR in two ways. The first is through accelerated depreciation and the second through investment tax credits. As the table indicates, this variable explains 90% of the model's variation. However, it is important to note that the sign of the beta coefficient is positive while the hypothesized direction of the beta coefficient is negative.

Table 15. Results from using the forward elimination technique for stepwise regression.

	Source			Variable		
	Model	Error	Total	Intercept	Capital Exp.	Inc./Assets
DF	2	494	496			
Sum of Squares	1135.62	116.38	1252.00			
Mean Square	567.81	.24				
F Value	2410.10					
Prob > F	.0001				.0001	.0003
R-Square	.9070					
B Value				.1267	.1059	1.0806
Std. Error					.0015	.2931
Incremental R^2					.9044	.0026

The next variable that entered the model is income deflated by assets. Wilke [1988] also used assets to deflate income. While this variable explains only .26% of the total variation, the variable is significant and potentially could be important when used on the holdout sample. Further, the beta coefficient for this variable is positive, which is the hypothesized direction of the coefficient.

The results of the estimation phase yielded the following model:

$$CTL = \alpha + \beta_1 \text{ Capex} + \beta_2 \text{ Inc2}$$

where:
CTL = Current Tax Liability
Capex = Capital Expenditures/Income
Inc2 = Income/Assets

Table 16 summarizes the results from using the estimation equation on the holdout group. The table indicates, that both variables in the model are significant at the .0001 level. In addition, as with the estimation model, the sign of the beta coefficient for capital expenditures is opposite of the hypothesized direction (i.e., positive instead of negative), and the sign of Inc2 is in the hypothesized direction. However, the most interesting result of using this model on the holdout group is that the R^2 is only .405. This represents a 223% decrease in the explained variation.

Table 16. Results from regression analysis on the holdout sample.

	Source			Variable		
	Model	Error	Total	Intercept	Capital Exp.	Inc./Assets
DF	2	495	497			
Sum of Squares	56.69	83.20	139.89			
Mean Square	28.35	.17				
F Value	168.66					
Prob > F	.0001					
R-Square	.4053					
Adj. R-Square	.4029					
Root Mean Square	.4100					
Dependent Mean	.4249					
Parameter Est.				0660	.2120	1.0100
Std. Error				.0414	.0117	.2454
T for $H_o = 0$				1.5940	18.1180	4.1140
Prob > T				.1116	.0001	.0001

While a decrease in the R^2 is expected, a decrease of this magnitude suggests that the data sets are unique.

In order to determine if the data sets are unique, the PROC STEPWISE procedure was used on the holdout sample to see if another model would have been suggested. The results of using the holdout group to specify the model indicates that if the holdout group had been used to form the estimation model, three additional variables would have been added to the model. These variables are debt-to-equity ratio; 1985 net property, plant, and equipment to 1985 gross property, plant, and equipment; and a dummy variable indicating that industry three (SIC 3000-3999) differs from other industries. However, the addition of these variables only improved the R^2 from .40 to .44.

The analysis of the descriptive statistics indicates that the mean and standard deviation of both the principle variable, capital expenditures deflated by income, and the dependent variable, CTL, are not consistent across the estimation and holdout group. The mean and standard deviation of CTL for the estimation group is .465 and 1.58 whereas the mean and standard deviation of the holdout group is .425 and .53. Further, for the estimation group the mean for capital expenditures deflated by income is 2.00 and the standard deviation is 14.38 while the mean and standard deviation for the holdout group are 1.11 and

1.70. The mean and standard deviation for the variable Inc2 are consistent across data sets.

In conclusion, because the sign of the beta coefficient for the main explanatory variable, capital expenditures, is not in the hypothesized direction and the R^2 for the holdout sample and the estimation sample differ greatly, the usefulness of this model to predict corporate effective tax rates is limited.

PHASE IV

The fourth phase of the study examined whether, over time, there is a difference between a corporation's effective tax rate (ETR), as measured in Phase I of the study, and a corporation's book effective tax rate (BETR). A corporation's book effective tax rate includes all deferred taxes, whereas a corporation's effective tax rate as measured in Phase I excludes all deferred taxes. The difference in BETR and ETR is referred to as a corporation's book tax difference (BTD). Because the only difference between these two measures is deferred taxes, the analysis of BTD should provide insight into the impact of deferred taxes on corporations.

As in Phase I, a 2x5 fixed factor design was employed to determine whether industry or size (as measured by sales) impacts BTD. The dependent variable (BTD) was analyzed using the seven measures of central tendency

discussed in Phase I. Accordingly, the results of each measure are presented separately.

Unweighted

The unweighted approach treats the book tax difference (BTD) between a corporation's 14-year weighted effective tax rate (ETR) and its 14-year weighted book effective tax rate (BETR) equally. The results of this measure are set forth in Table 17 and presented graphically in Figure 22. The table reveals that there exists a meaningful difference among industries. Therefore, the hypothesis that all industries have the same BTD is rejected. The BTD's range from .038 in SIC 3000-3999 to .191 in SIC 4000-4999. Interestingly, the manufacturing industries have the two lowest BTD's. This result is contrary to Huelten and Robertson [1984] who found that this industry has enjoyed tremendous tax advantages. In addition, all of the book tax differences are positive. Indicating, that from 1973 through 1986, the average balance in a corporation's deferred tax account grew by between 3.8% to 19.1% of income.

The hypothesis that large and small corporations, as measured by sales, have equal BTD's is also rejected. Small corporations, on average, have BTD's of .054 whereas, large corporations have BTD's of .097. The difference between these two groups is meaningful and in

Table 17. Measuring the mean corporate book tax difference and standard deviation using a 14-year unweighted average.

SIC Code Industry	Overall	Grouped by Sales Large	Small	Difference
1000-1999 Mining Petroleum Construction	.085 (.258)	.092 (.122)	.080 (.317)	.012 (-.195)
2000-2999 Manufacturing Non-Durable	.053 (.088)	.073 (.086)	.030 (.080)	.043 (.006)
3000-3999 Manufacturing Durable	.038 (.309)	.043 (.112)	.035 (.382)	.008 (-.270)
4000-4999 Communication Shipping Airline	.191 (.086)	.200 (.078)	.172 (.101)	.028 (-.023)
5000-5999 Trade	.054 (.083)	.066 (.061)	.038 (.102)	.028 (-.041)
Total	.075 (.215)	.097 (.109)	.054 (.282)	.043 (-.173)

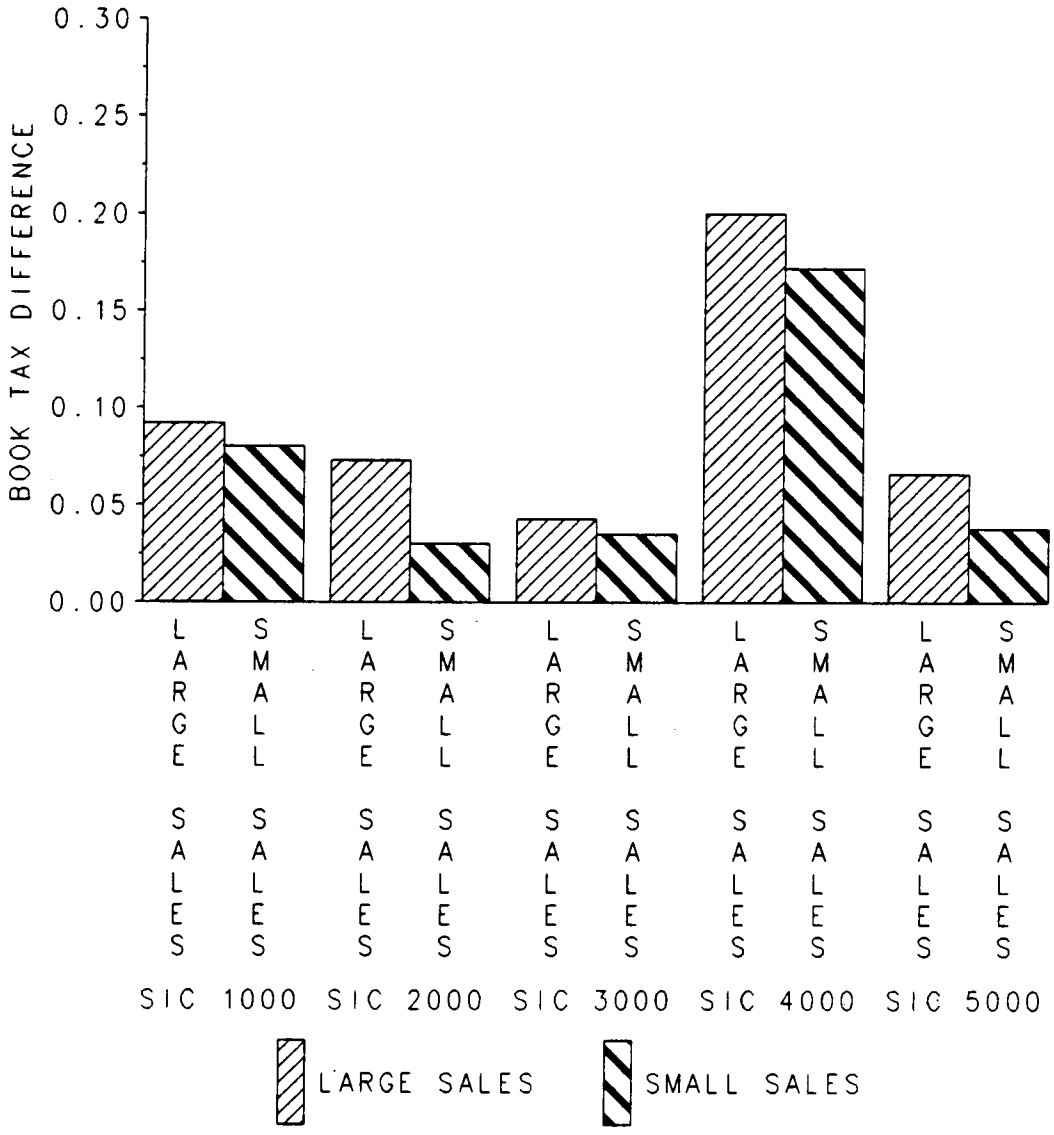


Figure 22. Comparison of book tax differences by sales and industry using a 14-year unweighted average (see Table 17).

the hypothesized direction. Although the overall comparison between large and small corporations is meaningful, this difference is primarily driven by the meaningful difference found within industry SIC 2000-2999 and SIC 4000-4999.

The overall hypothesis that ETR and BETR are equal (BTD = 0 for each cell) is rejected for all industries except SIC 3000-3999 (.038). This hypothesis is also rejected for both sales classifications. However, within the industries the hypothesis is not rejected for small firms in SIC 2000-2999, SIC 3000-3999, and SIC 5000-5999.

As with the unweighted analysis in Phase I, the standard deviations across industry and within industry are large and not consistent. This problem is caused by the high standard deviations in SIC 1000-1999 and SIC 3000-3999.

Weighted

Unlike the unweighted approach, where each observation within the cell is treated equally, the weighted approach places greater emphasis on the larger companies within each cell. Table 18 sets forth the results from using this measure of central tendency. As both Table 18 and Figure 23 indicate, there is a meaningful difference among BTD's across industries. Therefore, the hypothesis that the BTD's of all industries are equal is rejected. The

Table 18. Measuring the mean corporate book tax difference and standard deviation using a 14-year weighted average.

SIC Code Industry	Overall	Grouped by Sales Large	Small	Difference
1000-1999 Mining Petroleum Construction	.096 (.123)	.076 (.104)	.164 (.156)	-.088 (-.052)
2000-2999 Manufacturing Non-Durable	.081 (.044)	.083 (.044)	.036 (.045)	.047 (-.001)
3000-3999 Manufacturing Durable	.045 (.091)	.046 (.092)	.034 (.076)	.012 (.016)
4000-4999 Communication Shipping Airline	.239 (.091)	.242 (.089)	.166 (.093)	.076 (-.004)
5000-5999 Trade	.072 (.056)	.075 (.056)	.038 (.038)	.037 (.018)
Total	.118 (.106)	.120 (.106)	.076 (.102)	.044 (.004)

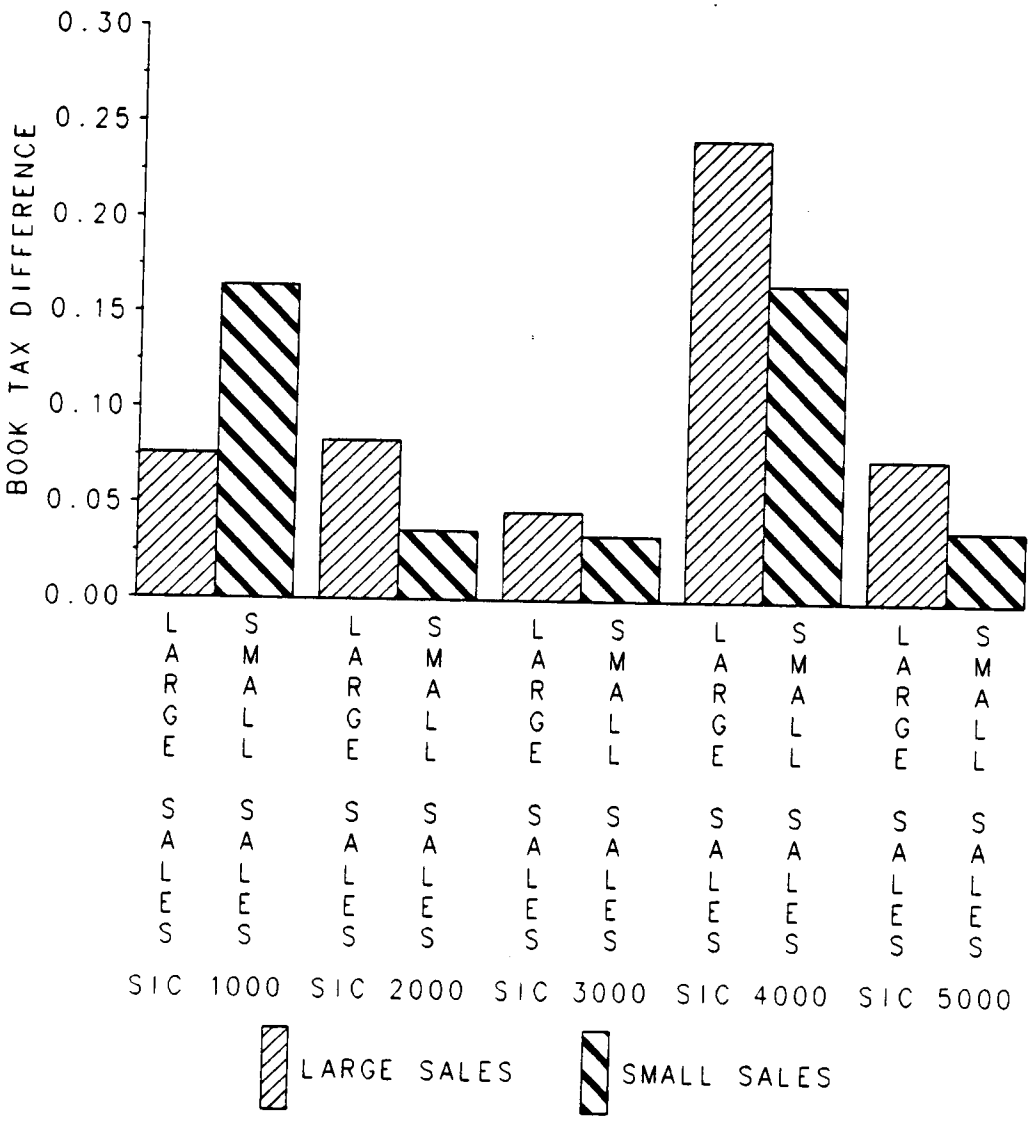


Figure 23. Comparison of book tax differences by sales and industry using a 14-year weighted average (see Table 18).

BTD's range from .045 in SIC 3000-3999 to .239 in SIC 4000-4999. The size hypothesis that both large and small firms have the same BTD's is also rejected. However, unlike the unweighted approach where only one industry revealed a meaningful difference between large and small corporations, the table shows that SIC 1000-1999, 2000-2999, and 4000-4999 all having meaningful differences.

Unlike the unweighted measure, the overall hypothesis that ETR and BETR are equal is rejected for all industries and both sales classifications. However, within the industries the hypothesis is not rejected for small firms in SIC 2000-2999, SIC 3000-3999, and SIC 5000-5999. With the exception of SIC 1000-1999, the standard deviations are relatively small and consistent.

Trimmed Unweighted

As discussed in Phase I, the trimmed mean is calculated by deleting all the observations above the 75th percentile and below the 25th percentile. Table 19 sets forth the results from using this measure. Because of the impact of SIC 4000-4999, the hypothesis that all industries have equal BTD's is rejected.

The hypothesis that both large and small firms have the same BTD is not rejected. The difference between these two groups is only .015. In assessing whether there are size differences within industry, Table 19 reveals

Table 19. Measuring the trimmed mean corporate book tax difference and standard deviation using a 14-year unweighted average.

SIC Code Industry	Overall	Grouped by Sales: Large	Grouped by Sales: Small	Difference
1000-1999				
Mining	.057	.036	.072	-.036
Petroleum	(.056)	(.045)	(.060)	(-.015)
Construction				
2000-2999				
Manufacturing	.060	.069	.049	.020
Non-Durable	(.045)	(.045)	(.043)	(.002)
3000-3999				
Manufacturing	.044	.043	.040	.003
Durable	(.042)	(.044)	(.041)	(.003)
4000-4999				
Communication	.102	.102	.102	.000
Shipping	(.061)	(.060)	(.064)	(-.004)
Airline				
5000-5999				
Trade	.059	.064	.052	.012
	(.040)	(.041)	(.037)	(.004)
Total	.056	.064	.049	.015
	(.047)	(.047)	(.046)	(.001)

that none of the differences are meaningful. The overall hypothesis that ETR and BETR are equal is rejected for all industries and for both sales classifications. Within industries the hypothesis that ETR and BETR are equal was rejected for all cells except large SIC 1000-1999. Finally, the standard deviations both within and across industry are small and consistent.

Trimmed Weighted

Table 20 and Figure 24 set forth the results of the trimmed weighted measure of central tendency. The results, with one exception, are consistent with those reached for the unweighted trimmed mean. That is, the hypothesis that all industries have the same BTD is rejected; the hypothesis that large and small firms have equal BTD's is not rejected; and, the hypothesis that large and small firms within industry have equal BTD's, with the exception of SIC 1000-1999, is not rejected.

Specifically, the study found that the industry BTD's ranged from .046 for SIC 3000-3999 to .121 for SIC 4000-4999. The difference between the large sales firms and the small sales firms is only .015 and, thus, is considered not to be a meaningful difference. Unlike the unweighted trimmed mean, the within industry comparison for SIC 1000-1999 reveals a meaningful difference (.056). Consistent with the findings in Phase I, this difference

Table 20. Measuring the trimmed mean corporate book tax difference and standard deviation using a 14-year weighted average.

SIC Code Industry	Overall	Grouped by Sales: Large	Grouped by Sales: Small	Difference
1000-1999 Mining Petroleum Construction	.055 (.051)	.038 (.038)	.094 (.054)	-.056 (-.016)
2000-2999 Manufacturing Non-Durable	.072 (.042)	.073 (.042)	.048 (.035)	.025 (.007)
3000-3999 Manufacturing Durable	.046 (.036)	.047 (.036)	.039 (.035)	.008 (.001)
4000-4999 Communication Shipping Airline	.121 (.063)	.121 (.064)	.114 (.050)	.007 (.014)
5000-5999 Trade	.075 (.052)	.076 (.053)	.045 (.022)	.031 (.031)
Total	.069 (.048)	.070 (.048)	.055 (.046)	.015 (.002)

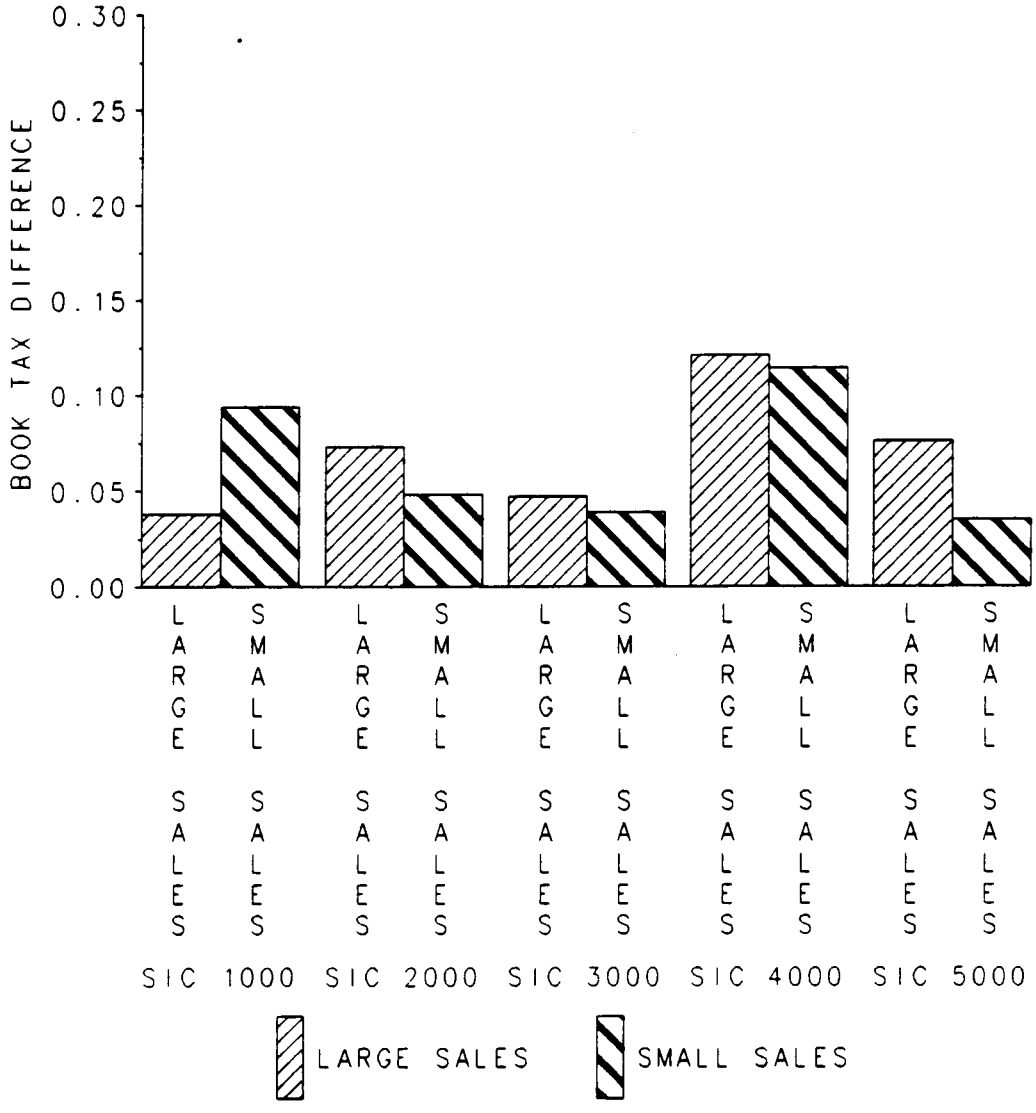


Figure 24. Comparison of book tax differences by sales and industry using a 14-year weighted trimmed mean (see Table 20).

shows that small firms defer more taxes than large firms. As with the unweighted trimmed measure, the overall hypothesis that ETR and BETR are equal for each cell is rejected for all industries and for both sales classifications. Within industries this hypothesis is not rejected for large firms in SIC 1000-1999 and small firms in SIC 3000-3999. Finally, the standard deviations reveal that the ETR's across industries and between groups overlap.

Winsorized Unweighted

Table 21 summarizes the results of the Winsorized unweighted measure. Consistent with all the measures previously examined, the hypothesis that the mean BTD's across industry are equal is rejected. Specifically, the study found that BTD ranged from .046 in SIC 3000-3999 to .119 in SIC 4000-4999. As with the previous methods discussed, these two industries had the lowest and highest BTD's.

Table 21 also indicates that the large firms and the small firms are not meaningfully different from each other. Therefore, the hypothesis that the firms have equal BTD's with respect to size is not rejected. Further, the study found that there is no difference between large and small firms within industry. The overall hypothesis that ETR and BETR are equal for each

Table 21. Measuring the Winsorized mean corporate book tax difference and standard deviation using a 14-year unweighted average.

SIC Code Industry	Overall	Grouped by Sales: Large	Grouped by Sales: Small	Difference
1000-1999 Mining Petroleum Construction	.076 (.051)	.064 (.050)	.083 (.051)	-.019 (-.001)
2000-2999 Manufacturing Non-Durable	.057 (.041)	.070 (.043)	.042 (.035)	.028 (.008)
3000-3999 Manufacturing Durable	.047 (.039)	.053 (.042)	.043 (.036)	.010 (.006)
4000-4999 Communication Shipping Airline	.119 (.031)	.122 (.027)	.112 (.038)	.010 (-.011)
5000-5999 Trade	.053 (.038)	.061 (.039)	.042 (.033)	.019 (.006)
Total	.065 (.047)	.077 (.047)	.053 (.044)	.024 (.003)

cell is rejected for all industries and for both sales classifications. Finally, the standard deviations within and across industry are small and consistent.

Winsorized Weighted

The results of using the Winsorized weighted measure are found in Table 22 and Figure 25 and, with one exception, are similar to the results using the unweighted Winsorized measure. The hypothesis that the mean BTD's are equal is rejected and the hypothesis that there is a meaningful difference between firms with respect to size is not rejected. Unlike the unweighted Winsorized measure, within SIC 1000-1999 there is a meaningful difference (.044). As with the unweighted Winsorized measure, the overall hypothesis that ETR and BETR are equal for each cell is rejected for all industries and for both sales classifications. As with the trimmed and Winsorized measures, the standard deviations are small and consistent across industry and size.

Median

As discussed in Phase I, the median is considered a better measure of central tendency when the distribution(s) are asymmetrical. Therefore, by examining this measure, additional insight is provided into the distribution of book tax differences (BTD's). Specifically, the median is useful in further supporting

Table 22. Measuring the Winsorized mean corporate book tax difference and standard deviation using a 14-year weighted average.

SIC Code Industry	Overall	Grouped by Sales: Large	Grouped by Sales: Small	Difference
1000-1999 Mining Petroleum Construction	.066 (.049)	.056 (.047)	.100 (.041)	-.044 (.006)
2000-2999 Manufacturing Non-Durable	.079 (.035)	.080 (.035)	.041 (.030)	.039 (.005)
3000-3999 Manufacturing Durable	.047 (.039)	.048 (.039)	.040 (.033)	.008 (.006)
4000-4999 Communication Shipping Airline	.126 (.020)	.127 (.019)	.112 (.037)	.015 (-.018)
5000-5999 Trade	.065 (.036)	.067 (.036)	.035 (.022)	.032 (.014)
Total	.085 (.044)	.086 (.043)	.061 (.046)	.025 (-.003)

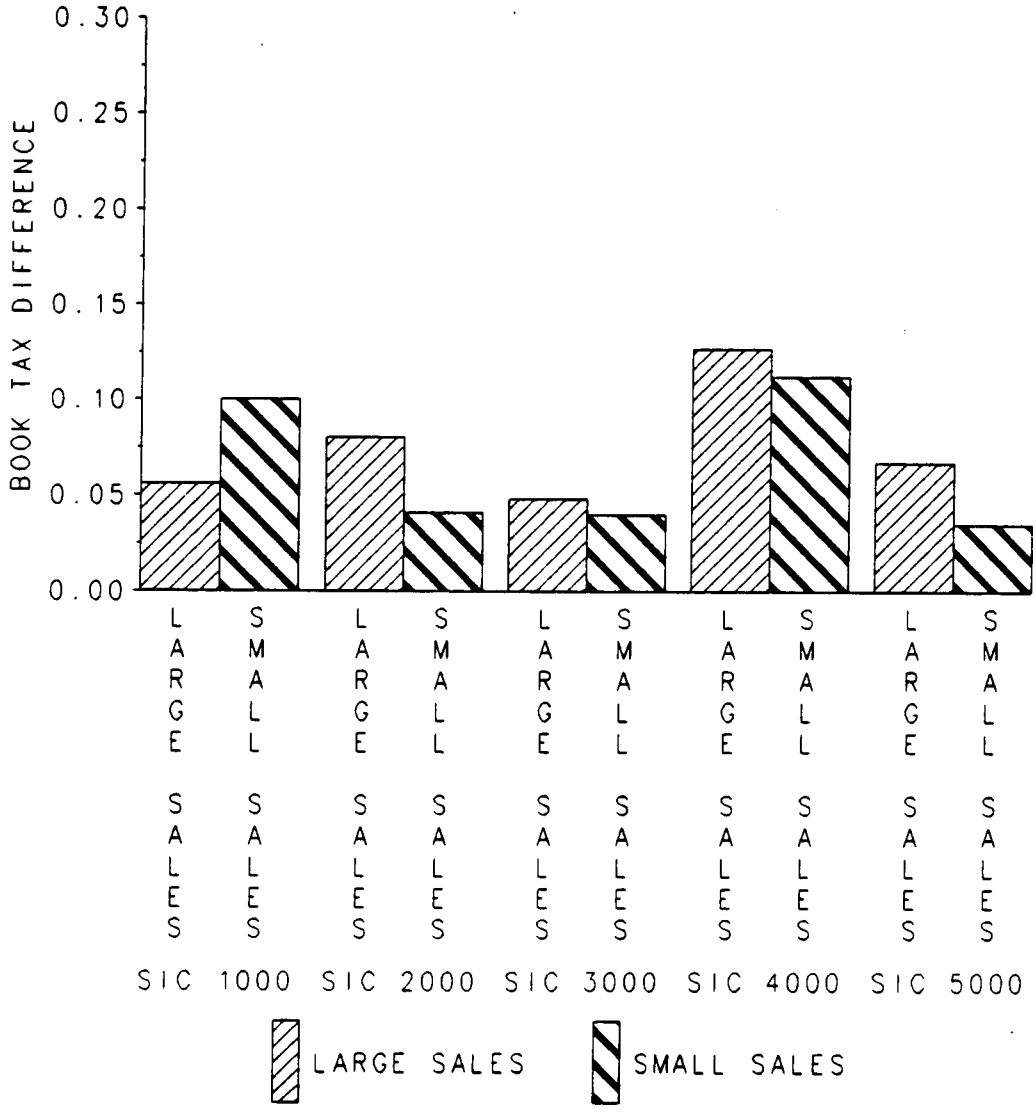


Figure 25. Comparison of book tax differences by sales and industry using a 14-year weighted Winsorized mean (see Table 22).

the conclusions reached with the unweighted mean. If the distribution is symmetrical the results shown in Table 23 should be similar to the results in Table 17.

The conclusions reached with respect to the two main hypotheses are consistent with the unweighted section. That is, the hypothesis that all industry means are equal is rejected and the hypothesis that both sales groups are equal is rejected. The industry median BTD's ranged from .027 to .202. Again, SIC 3000-3999 had the lowest BTD while SIC 4000-4999 had the highest BTD. The difference between firms with respect to size is .041 compared with .042 for the unweighted measure.

The overall hypothesis that BTD = 0 in each cell of the research design is rejected for all industries except SIC 3000-3999 and the group small sales. In addition, the study failed to reject this hypothesis for small firms within SIC 2000-2999, SIC 3000-3999, and SIC 5000-5999 and large firms within SIC 3000-3999. These results are consistent with the results of the unweighted measure except that (BTD = 0) for large sales firms within SIC 3000-3999 is not rejected using the unweighted measure.

Yearly Results

While the median is helpful in supporting the conclusions discussed in the unweighted section, examining the yearly BTD's is useful in verifying the conclusions

Table 23. Measuring the median corporate book tax difference.

SIC Code Industry	Overall	Grouped by Sales Large	Small	Difference
1000-1999 Mining Petroleum Construction	.078	.044	.098	-.054
2000-2999 Manufacturing Non-Durable	.041	.062	.026	.036
3000-3999 Manufacturing Durable	.027	.039	.024	.015
4000-4999 Communication Shipping Airline	.202	.212	.182	.030
5000-5999 Trade	.042	.054	.030	.024
Total	.049	.073	.032	.041

reached in the weighted section. In addition to calculating a 14-year book tax difference, the study also examined book tax differences on a yearly basis using the weighted approach. The results of this analysis are presented in Table 24.

As the tables indicate, with the exception of SIC 1000-1999 and to a lesser extent SIC 3000-3999, large firms defer more taxes than small firms. Within SIC 1000-1999, except for the first two years (i.e., 1973 and 1974), small companies defer more taxes than large firms. While SIC 3000-3999 reveals that in eight of the fourteen years, large firms defer more taxes than small firms. In examining the overall means by-year for each industry, the results indicate that SIC 4000-4999 consistently has the largest BTD's while SIC 3000-3999 has the lowest. These results are consistent with those presented in discussing the weighted BTD's (see Table 18).

Further supporting the conclusions discussed above is Table 25 which shows the individual company book tax differences over the 14-year period. As the table indicates, SIC 3000-3999 has the greatest number of companies, 242 (i.e., column one, two, and three for both large and small), that do not reveal a meaningful difference between ETR and BETR. This represents 60% of the firms in this classification. This indicates that over the 14-year period, these firms had an effective tax

Table 24. Measuring the book tax difference by year using a weighted average.

Year	Overall	Large	Small	Diff.
Sic Code 1000-1999 (Mining, Petroleum and Construction)				
1973	.059	.067	.027	.040
1974	.037	.039	.027	.012
1975	.094	.095	.086	.009
1976	.127	.116	.128	-.012
1977	.109	.107	.121	-.014
1978	.163	.150	.267	-.117
1979	.112	.103	.135	-.032
1980	.096	.081	.147	-.066
1981	.173	.154	.236	-.082
1982	.107	.082	.178	-.096
1983	.095	-.012*	.283	-.295
1984	.012	-.062*	.224	-.286
1985	NA	NA	.255	---
1986	NA	NA	NA	---

* The negative sign indicates that the corporate effective tax rate is greater than the book tax rate.

Table 24. (continued)

Year	Overall	Large	Small	Diff.
Sic Code 2000-2999 (Manufacturing Non-Durables)				
1973	.034	.034	.013	.021
1974	.023	.023	.011	.012
1975	.060	.061	.017	.044
1976	.060	.064	.024	.040
1977	.064	.065	.028	.037
1978	.068	.070	.021	.049
1979	.058	.059	.017	.042
1980	.090	.091	.033	.058
1981	.108	.108	.052	.056
1982	.125	.127	.077	.050
1983	.096	.097	.046	.051
1984	.092	.093	.052	.041
1985	.099	.106	.056	.050
1986	.100	.104	.017	.087

Table 24. (continued)

Year	Overall	Large	Small	Diff.
Sic Code 3000-3999 (Manufacturing Durables)				
1973	.023	.013	.025	-.012
1974	.030	.031	.021	.010
1975	.046	.047	.030	.017
1976	.031	.031	.027	.004
1977	.022	.021	.037	-.016
1978	.040	.040	.032	.008
1979	.029	.029	.030	-.001
1980	.064	.067	.046	.021
1981	.033	.033	.033	.000
1982	.037	.036	.041	-.005
1983	.091	.092	.075	.017
1984	.025	.025	.028	-.003
1985	.034	.033	.049	-.016
1986	.118	.127	-.010*	.137

* The negative sign indicates that the corporate effective tax rate is greater than the book tax rate.

Table 24. (continued)

Year	Overall	Large	Small	Diff.
Sic Code 4000-4999 (Communication, Shipping and Airline)				
1973	.149	.150	.117	.033
1974	.125	.125	.105	.020
1975	.252	.254	.188	.066
1976	.255	.257	.167	.090
1977	.255	.257	.157	.100
1978	.234	.236	.173	.063
1979	.245	.247	.177	.070
1980	.242	.244	.177	.067
1981	.245	.248	.173	.075
1982	.282	.286	.185	.101
1983	.332	.339	.165	.174
1984	.230	.233	.159	.074
1985	.237	.241	.174	.067
1986	.179	.180	.155	.025

Table 24. (continued)

Year	Overall	Large	Small	Diff.
Sic Code 5000-5999 (Trade)				
1973	.081	.084	.032	.052
1974	.094	.098	.033	.065
1975	.046	.048	.015	.033
1976	.072	.076	.008	.068
1977	.073	.076	.013	.063
1978	.039	.041	.011	.030
1979	.058	.062	-.002*	.064
1980	.003	.002	.023	-.021
1981	.063	.066	.021	.045
1982	.095	.098	.049	.049
1983	.109	.113	.057	.056
1984	.091	.095	.048	.047
1985	.079	.081	.043	.038
1986	.064	.067	.029	.038

* The negative sign indicates that the corporate effective tax rate is greater than the book tax rate.

Table 25. Measuring the book tax difference by company using a 14-year weighted average.

	LARGE				
SIC Code Industry	BTD <.00	BTD .00-.020	BTD .020-.040	BTD >.040	Total
1000-1999 Mining Petroleum Construction	3	6	3	12	24
2000-2999 Manufacturing Non-Durable	10	11	34	96	151
3000-3999 Manufacturing Durable	34	21	22	74	151
4000-4999 Communication Shipping Airline	2	1	3	134	140
5000-5999 Trade	7	11	11	52	81
Total	56	50	73	368	547

Table 25. (continued)

SMALL					
SIC Code Industry	BTD <.00	BTD .00-.020	BTD .020-.040	BTD >.040	Total
1000-1999 Mining Petroleum Construction	9	1	3	25	38
2000-2999 Manufacturing Non-Durable	19	33	32	44	128
3000-3999 Manufacturing Durable	53	58	54	88	253
4000-4999 Communication Shipping Airline	5	1	1	57	64
5000-5999 Trade	6	12	23	24	65
Total	92	105	113	238	548

rate that was approximately equal to their book tax rate. Thus, over this period, these companies did not experience a meaningful increase in their deferred taxes. This result is extremely surprising since the manufacturing industry, especially durables, is often cited as the industry which has received generous tax incentives in the form of accelerated depreciation rates and investment tax credits [Huelten and Robertson, 1984]. The table also makes apparent the fact that the communication, shipping, and airline industries have enjoyed significant tax deferrals. Of the 204 companies in that classification, 191 (93.6%) have BTD's in excess of 4%.

Finally, Table 26 and Figure 26 set forth the relationship, by year, between BETR and ETR. As the figure clearly indicates, BETR is greater than ETR. This means that, overall, corporations are consistently deferring income taxes. An interesting observation is that with the exception of the first two years, the difference between BETR and ETR has been approximately 10%, but since Economic Recovery Tax Act of 1981 this difference has increased to over 15%.

Conclusions

Overall, the study found that book tax differences are not consistent across industries and are affected by the size of the firm (see Table 27). This suggests that some

Table 26. Comparison of the yearly mean effective tax rate with book effective tax rate using a weighted average.

Year	Effective Tax Rate	Book Tax Rate	Book Tax Difference
1973	.398	.461	-.063
1974	.464	.518	-.054
1975	.390	.498	-.108
1976	.362	.469	-.107
1977	.378	.483	-.105
1978	.370	.475	-.105
1979	.357	.455	-.098
1980	.338	.459	-.121
1981	.296	.429	-.133
1982	.258	.428	-.170
1983	.262	.426	-.164
1984	.299	.416	-.117
1985	.322	.446	-.142
1986	.303	.426	-.123

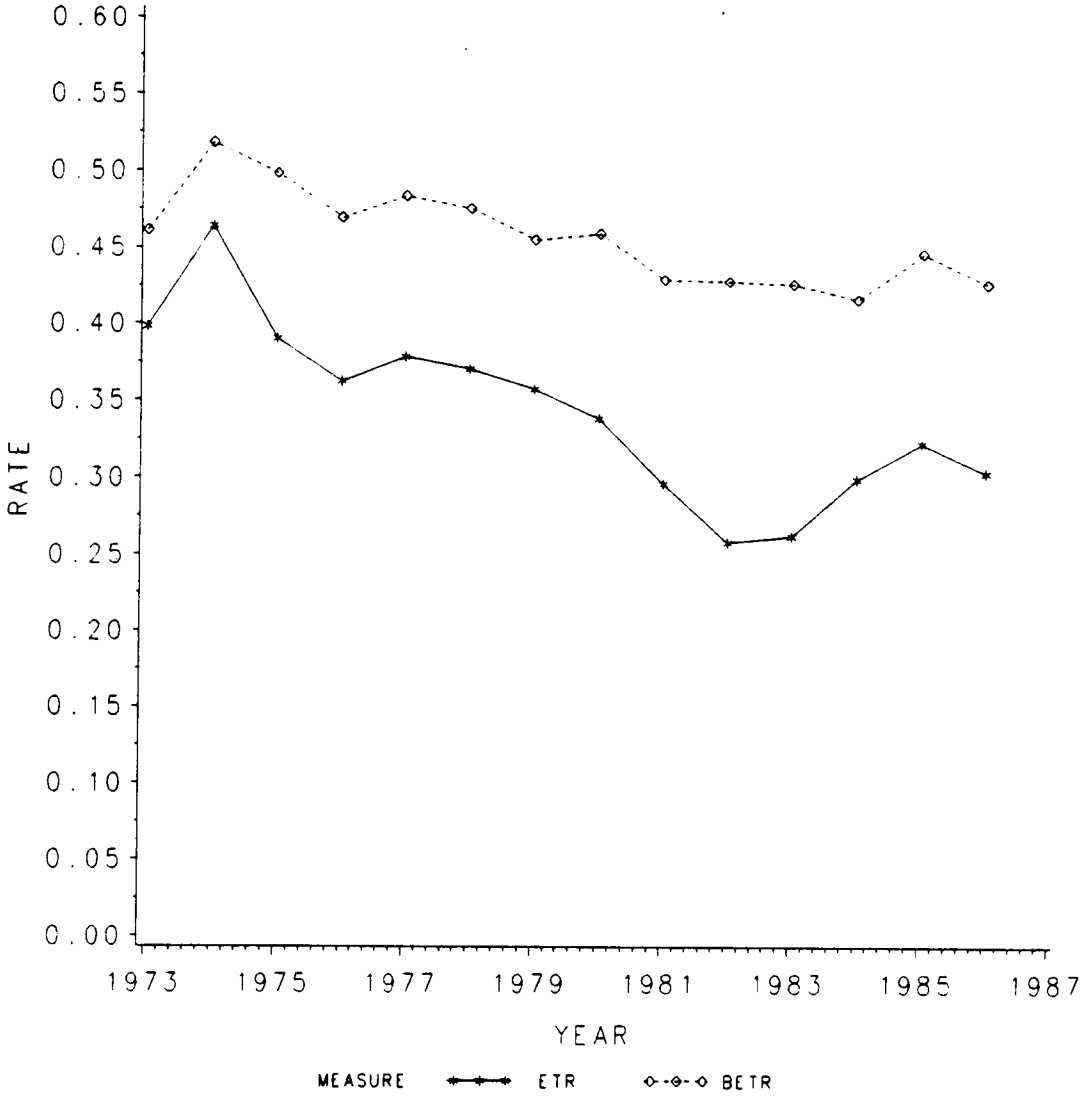


Figure 26. Comparison of the yearly mean effective tax rate with book effective tax rate using a weighted average (see Table 26).

Table 27. Recapitulation of book tax differences.

SIC CODE Industry	Unweighted	Weighted	Unweighted Trimmed	Weighted Trimmed	Unweighted Winsorized	Weighted Winsorized	Median
OVERALL							
LARGE							
SMALL							
1000-1999	.085	.096	.057	.055	.076	.066	.078
Mining	.092	.076	.036	.038	.064	.056	.044
Petroleum	.080	.164	.072	.094	.083	.100	.098
Construction							
2000-2999	.053	.081	.060	.072	.057	.079	.041
Manufacturing	.073	.083	.069	.073	.070	.080	.062
Non-Durable	.030	.036	.049	.048	.042	.041	.026
3000-3999	.038	.045	.044	.046	.047	.047	.027
Manufacturing	.043	.046	.043	.047	.053	.048	.039
Durable	.035	.034	.040	.039	.043	.040	.024
4000-4999	.191	.239	.102	.121	.119	.126	.202
Communication	.200	.242	.102	.121	.122	.127	.212
Shipping	.172	.166	.102	.114	.112	.112	.182
Airline							
5000-5999	.054	.072	.059	.075	.053	.065	.042
Trade	.066	.075	.064	.076	.061	.067	.054
	.038	.038	.052	.045	.042	.035	.030
Overall Total	.075	.118	.056	.069	.065	.085	.049
Large Total	.097	.120	.064	.070	.077	.086	.073
Small Total	.054	.076	.049	.055	053	.061	.032

industries are afforded a greater opportunity to defer taxes than other industries, and larger firms within an industry also enjoy this benefit. Again, this latter point is consistent with the theory espoused by Siegfried [1972] and Porcano [1986] that larger firms can minimize their taxes by either influencing the political process or acquiring tax expertise.

From a financial statement perspective, the results indicate that on a year-by-year basis in only three years was the overall difference between ETR and BETR less than .100. Since the sole difference between these two rates is deferred taxes, a strong argument can be made that a major portion of the balance sheet account for deferred taxes should not be classified as a liability. In essence, a portion of the balance in this account represents a permanent difference not a temporary difference between a firm's book tax expense and its tax liability. SFAC No. 3 requires that only probable future sacrifices be classified as a liability, as the results indicate a large portion of deferred taxes do not represent probable future sacrifice. Whether SFAS No. 96 will correct this problem can only be determined after this statement has been in effect for a number of years.

Finally, the results indicate that the SEC's requirement that a corporation reconcile its book effective tax rate with the federal statutory rate is

useless. If BETR is always greater than ETR, as Figure 26 depicts, and ETR represents a corporation's actual tax liability, than the information disclosed in the book tax reconciliation cannot be of use to investors or creditors since it does not provide any information concerning current or future cash flows.

CHAPTER 6

CONCLUSIONS, CONTRIBUTIONS, AND LIMITATIONS

This chapter is divided into four sections. The first section synthesizes the results of the study and discusses the tax policy and/or financial accounting implications of the results. Since the study consisted of four phases, the conclusions of each phase are set forth separately. Section two sets forth the contributions of the study, and the third section presents the limitations of the study. The fourth section discusses possible areas for future research.

CONCLUSIONS

Phase I

The first phase of the study was designed to assess whether corporate effective tax rates (ETR) differ depending on the size of the firm, as measured by sales, or industry. The results of the research indicate that the measure of central tendency (e.g., unweighted, weighted, etc.) is important in determining whether size, as measured by sales, has an effect. Specifically, the study found that when using the unweighted mean or the median, the hypothesis that large sales firms and small sales firms have equal ETR's is rejected. However, for all other measures: weighted, unweighted and weighted

trimmed, and unweighted and weighted Winsorized this hypothesis is not rejected. Further, the hypothesis originally proposed by Zimmerman that large firms (i.e., top 50) have greater ETR's than smaller firms (i.e., all other firms in his data set) is rejected using the unweighted measure, but is not rejected using the weighted measure.

The results from examining ETR on a yearly basis are consistent with the results using the 14-year average. The study found that for each of the 14 years examined smaller firms in SIC 1000-1999 have lower ETR's than larger firms and that the larger firms in SIC 4000-4999 and 5000-5999, with the exception of 1974 for SIC 4000-4999, have lower ETR's than smaller firms. Therefore, whether size has an affect on ETR is dependent on the measure of central tendency employed.

This occurs because the weighted measure places more emphasis on the ETR of larger firms then does the unweighted measure. Thus, if the large firms in an industry have higher ETR's then the small firms in that industry, the overall ETR for that industry will be higher using the weighted measure then with the unweighted measure. Therefore, tax policy studies need to consider this factor in determining whether size effects ETR.

In examining whether industry has an effect on ETR, the results indicate that with the exception of the

unweighted trimmed measure, the hypothesis that ETR is equal across industries is rejected. Further, when ranking the industries across all measures of central tendency, SIC 4000-4999 has the lowest ETR while SIC 3000-3999 and SIC 5000-5999 has the largest ETR.

The results of examining ETR across industries indicate that different industries have different effective tax rates. From a tax policy perspective, the issue that Congress needs to address is whether they intended certain industries to receive greater tax incentives then other industries. If so, they have achieved their goals. If not, they need to carefully analyze the tax incentives in the code and how they are utilized by different industries so as to scaleback or amend the provisions which favor these industries.

By also examining ETR's on a yearly basis the study is able to show that previous studies which examined effective tax rates on a year-by-year basis have provided misleading results. The results indicate that since 1980 corporate ETR's have been subject to wild fluctuations. Therefore, ETR studies based on only one or two years of data can provide a misleading picture of a corporation's long-term ETR.

Phase II

The second phase of the study was designed to assess whether corporate effective tax rates are regressive, proportional, or progressive given a financial characteristic. The five financial characteristics examined were total sales, total assets, aggregate net income, capital expenditures, and debt-to-equity ratio. The analysis was done using two methods. The first was on a company-by-company basis, where for each company the 14-year ETR was plotted against the 14-year average of the financial characteristic being examined. The results of this first method indicated that there is no discernible relationship between ETR and any of the financial characteristics. Transformations of both the independent and dependent variable did not change this conclusion. The second method separated the companies into size quartiles, with Group 1 containing the smallest firms and Group 4 the largest firms. In examining the relationship between ETR and the financial characteristics, both the weighted and unweighted measures of central tendency were used. For sales, the study found that regardless of the measure used, ETR is only regressive over the first three groups with Group 4 showing a slightly higher ETR than Group 3, but not the highest ETR. For assets, the study found that regardless of the measure, ETR is regressive. Thus, for both variables, the results conflict with

Zimmerman's conclusion that large firms have higher ETR's. Thus, the question that needs to be asked is did Congress intend for larger firms to have, on average, lower effective tax rates?

With respect to aggregate net income (ANI), the study found that regardless of the measure employed, with the exception of the smallest firms, the relationship between ETR and ANI is proportional. This indicates that larger firms are better able to utilize tax incentives since these firms are able to show a large book income, yet have an ETR that is not meaningfully different from a firm with a lower book income. These results support the legislation enacted in TRA86 which requires a corporation to include one-half of its book income in calculating its alternative minimum tax liability.

The relationship between capital expenditures and ETR is as expected. The larger the average capital expenditures over 14 years, the lower the effective tax rate. The tax policy question is whether Congress intended that corporations which are capital intensive to enjoy, on average, lower effective tax rates? Accelerated depreciation and the investment tax credit are intended to help spur economic investment with the expectation that in the future a company will enjoy greater profits and, thus, pay higher taxes. In essence, over time, the government will recoup these initial tax incentives. However, the

results of this study indicate that this is not true and that, over time, the larger a firm's capital expenditures the lower its ETR.

Finally, both the weighted and unweighted measures indicate that the relationship between ETR and a firm's debt-to-equity ratio is not progressive, regressive or proportional. That is, the study found that there is no relationship between these variables. The results also indicate that for both measures the firms with the largest debt-to-equity ratios have the highest effective tax rates. Thus, the results of this study conflict with the popular belief that companies which incur more debt have lower effective tax rates.

Phase III

The third phase of the study examined whether financial characteristics can be used to predict a corporation's current tax liability. The following financial characteristics were examined: modified book income deflated by sales; modified book income deflated by assets (Inc2); debt-to-equity ratio; capital expenditures deflated by modified book income (Capex); the ratio of 1985 net property, plant, and equipment to 1985 gross property, plant, and equipment; foreign operations; inventory method; and industry. A two-step process was

used to determine whether these financial characteristics could predict a corporation's current tax liability.

In the first step an estimation model was formed using stepwise regression. The estimation model found that two variables, Capex and Inc2, explain 90% of the variation in the model. These variables are significant at the .0001 and .0003 level, respectively. However, the hypothesized sign of Capex, which explained almost all the variation, is not in the hypothesized direction.

The second step required that the two variables selected by the estimation model be applied to a holdout group of firms. This step is necessary in order to validate the estimation model. The results of this procedure are disappointing. While it was anticipated that the explained variation of the model would decrease, it was not anticipated that this decrease would be from .90 to .40. Further, as with the estimation model, the sign of Capex was not in the hypothesized direction. While both variables are significant at the .0001 level, the inconsistency between the holdout group and the estimation group, along with the sign of the primary explanatory variable not being in the hypothesized direction, places severe restrictions on the use of this model as a tool for predicting a corporation's current tax liability.

Phase IV

The fourth phase of the study investigated whether a corporation's book effective tax rate differs from a corporation's effective tax rate. The difference between these two variables is the amount of deferred taxes that did not reverse over the 14-year period. Specifically, the study examined two questions. First, is the dependent variable (i.e., BTD) meaningfully different across industry or size? Second, is the dependent variable meaningfully different than zero?

The study found that for all measures of central tendency, BTD is meaningfully different across industry. In fact, for all the measures of central tendency, SIC 4000-4999 had the largest BTD while SIC 3000-3999 (manufacturing non-durables) had the smallest BTD. This result is surprising since corporations in SIC 3000-3999 are perceived to enjoy greater tax incentives than other corporations. In assessing whether BTD is affected by the size of a firm, the results revealed that only the unweighted, weighted, and median measures indicate that a meaningful difference exists between large and small sales firms.

In assessing whether the dependent variable, BTD, is meaningfully different from zero (i.e., on a cell by cell basis), the results indicate that for almost all measures of central tendency there is a meaningful difference

between BTD and zero. Over the entire 14-year period there exists a meaningful difference between effective tax rates and book tax rates, and over the last seven years this difference has increased dramatically.

In summary, the results of the study indicate that from a macro perspective the deferred taxes set forth in the liability section of the balance sheet represent a permanent not temporary difference between a firm's book tax expense and its tax liability. The results also suggest that the information provided by the SEC's requirement that a corporation reconcile its book effective rate with the statutory federal rate is, at best, minimal. Since ETR represents a corporation's actual cash outlay for taxes and is consistently greater than BETR, the reconciliation of a corporation's BETR and the top marginal tax rate does not provide investors and creditors with any useful information concerning a corporation's current or future cash flow.

CONTRIBUTIONS

The study makes four contributions to the tax and accounting literature. The first contribution is the use of a 14-year weighted average approach to calculate a corporation's effective tax rate. Previous studies have only examined ETR on a yearly basis or over a short period of time. The results of this study indicate that ETR is

considerably higher when examined over a long period of time. By examining firms over a longer period of time, the study is able to examine the firms during both growth and non-growth periods thereby providing a more accurate portrayal of a firm's ETR.

Second, the study used seven different measures of central tendency to analyze whether size, as measured by sales, or industry had an affect on corporate effective tax rates. The two primary methods of central tendency used were unweighted and weighted averages. The unweighted average treated each corporation's 14-year weighted ETR equally in computing the mean ETR for each cell. The weighted average approach placed greater emphasis on the larger companies within each cell. The study found that when considering industry and size effects, the unweighted and weighted measures do not yield the same results. Further, when examining Zimmerman's size hypothesis these measures yielded conflicting results. Therefore, the study recommends that when examining effective tax rates both a weighted and unweighted approach should be used to test the hypothesis(es).

Third, the study examined 1,095 companies over a 14-year period. Thus, the study represents the largest examination of corporate effective tax rates to date. The study found that the small firms, with the exception of

firms in SIC 1000-1999, tended to have higher effective tax rates than large firms. Prior studies which examined only large firms were unable to make any assertions concerning the effect of size on ETR's.

Finally, Phase IV of the study examined the difference between book effective tax rates (BETR) and ETR. The study found that on both a company-by-company basis and in the aggregate BETR is consistently greater than ETR and this difference is meaningful. The results support the FASB's decision to change from the deferred method to the liability method of accounting for deferred taxes. However, only after SFAS No. 96 has been in effect for a number of years can any conclusions be made as to whether the liability method should have been selected instead of the partial approach or flow-through approach.

LIMITATIONS

The primary limitation of the study is that it did not examine corporate ETR's and BETR's over a full 20-year tax cycle. However, the Securities Exchange Commission did not require that a corporation separate taxes into current and deferred until 1973. Therefore, this study encompasses the longest possible time frame.

The second limitation of the study is that the corporations included in a company's consolidated financial statements are not always the same corporations

included in the company's consolidated tax return. Thus, the current tax burden disclosed in the financial statements might not coincide with the corporation's actual tax burden.

The third limitation of the study was the number of companies that had missing data. The total population of firms on the COMPUSTAT tapes was 3,214. However from the 3,214 firms on the tapes, only 1,095 firms had all the necessary data. The study anticipated that the population of firms examined would have been approximately 2,400 and a 5x6 (industry by size) research design would have been used. By having more firms in the study a more in depth analysis of industry (i.e., two digit versus 4 digit) and size effect could have been done.

FUTURE RESEARCH

Within each of the four phases of this study additional research still needs to be conducted to better understand the impact of taxes on corporations. An additional study that would be extremely insightful is to examine corporate effective tax rates during President Reagan's administration. As this study found, these rates, at least through the Tax Reform Act of 1986, were much lower than in the preceding eight years. In addition, this study could also examine whether industry or firm size is important. Another study could compare

the results of this study to ETR's calculated from data in the corporate source book. The corporate source book consists of aggregate, by industry, tax return data compiled by the Internal Revenue Service. While this data source could not be used for Phase IV, a study using this data source could further validate the conclusions reached in Phase I.

Within the second phase, a topic for future research is whether the alternative minimum tax has caused corporations with large book incomes to have higher effective tax rates. If not, then this complex piece of legislation is not necessary.

While Phase III did not provide meaningful results, a longitudinal study using cluster analysis could examine whether, over time, corporations which have the lowest effective tax rates possess the same financial characteristics.

Phase IV presents two areas of future research. First, additional research is needed to determine whether the results achieved in Phase IV will be affected by the implementation of SFAS No. 96. Future research into the relationship between a corporation's book effective tax rate and effective tax rate is needed to determine whether the difference, as noted in this study, still persists. If so, then the liability method still suffers from the same problem as the deferred method -- it fails to capture

the true tax liability of the firm. Further, since the new SFAS now takes a balance sheet approach to the presentation of deferred taxes instead of an income statement approach, the need to present a corporation's book effective tax rate is even more questionable. The reconciliation of the statutory federal rate to book tax expense represents the reconciliation between a marginal tax rate and a "plug" number.

Second, longitudinal research should be conducted into the magnitude and type of temporary differences that exist. A study of this nature would provide additional insight into the industries which benefit most from these tax incentives. By determining whether industries continually (i.e., over time) benefit by certain temporary differences, the impact of amending, repealing, or enacting new legislation can be better understood.

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APPENDIX

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
1000	CLEVELAND-CLIFFS INC	0.2430	93.31	383.96
1000	INCO LTD	0.5971	749.38	1254.99
1021	ATLAS CONS MINING & DEV	0.5267	74.13	140.74
1040	HECLA MINING CO	-1.6034	-29.50	18.40
1040	BENGUET CORP-CL B	0.1846	32.93	178.43
1040	HOMESTAKE MINING	0.2524	216.76	858.66
1040	CAMPBELL RED LAKE MINES	0.3023	155.43	514.17
1040	GIANT YELLOWKNIFE MINES LTD	0.3410	17.68	51.86
1040	AGNICO EAGLE MINES LTD	0.3444	32.39	94.02
1040	NEWMONT MINING CORP	0.3489	496.60	1423.50
1040	CALLAHAN MINING CORP	0.3546	34.27	96.64
1040	PLACER DOME INC	0.3895	206.59	530.39
1040	DOME MINES LTD	0.4188	237.06	566.10
1040	NORTHGATE EXPLORATION LTD	0.9517	16.27	17.10
1211	GULF RESOURCES & CHEMICAL	0.1282	20.10	156.75
1211	WESTMORELAND COAL CO	0.2140	40.46	189.04
1211	NACCO INDUSTRIES-CL A	0.2534	62.45	246.40
1211	PITTSTON CO	0.3099	271.89	877.35
1311	CONSOLIDATED OIL & GAS	-0.8513	-8.28	9.73
1311	RANGER OIL LTD	-0.2142	-25.07	117.09
1311	MITCHELL ENERGY & DEV	-0.0090	-9.44	1052.38
1311	FOREST OIL CORP	0.0039	0.67	173.19
1311	WILSHIRE OIL OF TEXAS	0.0139	0.46	33.06
1311	NORTH CANADIAN OILS LTD	0.0199	2.59	130.45
1311	PRAIRIE OIL ROYALTIES CO LTD	0.0671	4.00	59.57
1311	NOBLE AFFILIATES INC	0.0874	38.10	436.10
1311	APACHE CORP	0.0935	31.82	340.48
1311	BARUCH-FOSTER CORP	0.1863	2.43	13.06
1311	EQUITY OIL CO	0.1952	16.45	84.31
1311	SCURRY-RAINBOW OIL LTD	0.1973	48.93	248.01
1311	HAMILTON OIL CORP	0.2057	84.90	412.63
1311	KANEB SERVICES INC	0.2541	67.64	266.15
1311	WISER OIL CO	0.3420	76.82	224.62
1311	OCEAN DRILLING & EXPLORATION	0.6417	1202.01	1873.11
1381	ATWOOD OCEANICS	0.1050	10.15	96.69
1381	ROWAN COS INC	0.1565	80.50	514.23
1381	HELMERICH & PAYNE	0.3040	189.69	623.97
1381	ZAPATA CORP	0.4496	150.66	335.13
1381	PARKER DRILLING CO	0.7056	140.85	199.63
1389	HALLIBURTON CO	0.4623	2616.95	5660.30
1499	FREEPORT MCMORAN INC	0.0813	95.83	1178.33
1499	CALMAT CO	0.2049	45.43	221.67
1499	ZEMEX CORP	0.2806	6.82	24.30
1499	VULCAN MATERIALS CO	0.3082	368.13	1194.38
1520	FOREST CITY ENTRPRS INC-CL A	0.5135	11.10	21.61
1531	WASHINGTON HOMES INC	0.0683	1.80	26.34
1531	RYLAND GROUP INC	0.1301	24.16	185.78
1540	CENTEX CORP	0.0770	59.23	769.23
1540	TURNER CORP	0.1746	30.69	175.74
1540	BLOUNT INC-CL A	0.3547	175.62	495.07
1540	BANK BUILDING &EQUIP CORP AM	0.3704	12.62	34.08
1540	MORRISON KNUDSEN CORP	0.4387	283.43	646.11
1540	PERINI CORP	1.0626	47.74	44.93
1540	ACMAT CORP	2.9095	0.56	0.19
1600	BURNUP & SIMS INC	0.3127	19.65	62.85

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
1600	FOSTER WHEELER CORP	0.43447	351.87	809.9
1600	FLUOR CORP	0.44776	748.91	1672.6
1600	ELGIN NATIONAL INDUSTRIES	0.48859	61.79	126.5
1600	BANISTER CONT LTD	0.79157	19.33	24.4
1600	MYERS (L.E.) CO GROUP	1.01528	30.31	29.8
1700	APOGEE ENTERPRISES INC	0.42447	46.22	108.9
1700	FISCHBACH CORP	0.48300	121.86	252.3
2000	SARA LEE CORP	0.31196	945.75	3031.7
2000	CPC INTERNATIONAL INC	0.38029	1436.81	3778.2
2000	QUAKER OATS CO	0.38275	1224.97	3200.5
2000	KELLOGG CO	0.41131	1935.20	4705.0
2000	CAMPBELL SOUP CO	0.41707	1443.25	3460.5
2000	GENERAL MILLS INC	0.43088	1616.68	3752.1
2010	THORN APPLE VALLEY INC	0.23272	6.07	26.1
2010	CONAGRA INC	0.32367	386.55	1194.3
2010	BRIDGFORD FOODS CORP	0.33808	3.51	10.4
2010	HORMEL (GEO. A.) & CO	0.33855	209.86	619.9
2010	HOLLY FARMS CORP	0.40262	266.52	662.0
2010	DINNER BELL FOODS INC	0.43070	21.33	49.5
2020	BORDEN INC	0.31517	1084.79	3441.9
2020	KRAFT INC-NEW	0.38641	2784.38	7205.7
2020	DEAN FOODS CO	0.45212	179.37	396.7
2030	STONERIDGE RESOURCES INC	-0.33057	-3.15	9.5
2030	HEINZ (H.J.) CO	0.32915	1292.20	3925.8
2030	CONNELLY CONTAINERS INC	0.36716	7.70	21.0
2030	SMUCKER (J.M.) CO	0.45619	110.14	241.4
2046	AMERICAN MAIZE-PRODUCTS-CL A	0.28226	47.51	168.3
2048	SCOPE INDUSTRIES INC	0.42735	58.66	137.3
2050	FLOWERS INDUSTRIES INC	0.41151	141.41	343.6
2050	LANCE INC	0.44013	236.30	536.9
2050	TASTY BAKING CO	0.52403	42.68	81.5
2062	SAVANNAH FOODS & INDS	0.35676	128.93	361.4
2063	HOLLY SUGAR CORP	0.35639	41.18	115.5
2065	WRIGLEY (WM.) JR CO	0.45700	397.46	869.7
2065	TOOTSIE ROLL INDUSTRIES INC	0.48013	61.22	127.5
2070	ARCHER-DANIELS-MIDLAND CO	0.22038	470.36	2134.3
2082	ANHEUSER-BUSCH COS INC	0.23951	1378.66	5756.1
2082	HEILEMAN (G.) BREWING INC	0.29369	226.46	771.1
2085	SEAGRAM CO LTD	0.29455	1736.58	5895.7
2085	CANANDAIGUA WINE-CL B	0.40089	37.55	93.7
2085	BROWN-FORMAN CORP-CL B	0.41133	704.74	1713.3
2085	GLENMORE DISTILLERIES CO-B	0.42226	37.33	88.4
2086	PEPSICO INC	0.32175	1869.60	5810.8
2086	GENERAL CINEMA CORP	0.33935	368.42	1085.7
2099	STEWART SANDWICHES INC	0.39763	6.65	16.7
2099	GOLDEN ENTERPRISES	0.40032	43.56	108.8
2099	MCCORMICK & CO	0.44071	198.84	451.2
2111	PHILIP MORRIS COS INC	0.38568	5925.29	15363.3
2111	AMERICAN BRANDS INC-DEL	0.50537	3104.50	6143.0
2121	UST INC	0.43846	528.64	1205.7
2200	FIELDCREST CANNON INC	0.28196	95.29	338.0
2200	CROWNAMERICA INC	0.28571	12.47	43.7
2200	SPRINGS INDUSTRIES INC	0.34104	255.63	749.6
2200	UNIFI INC	0.36111	39.30	108.8
2200	QUAKER FABRIC CORP	0.37574	3.96	10.6

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
2200	DWG CORP	0.38492	148.48	385.73
2200	CROWN CRAFTS INC	0.40816	5.80	14.21
2200	BELDING HEMINWAY	0.41947	33.72	80.40
2250	STANWOOD CORP	-0.25801	-2.38	9.24
2250	ADAMS-MILLIS CORP	0.22680	13.16	58.04
2250	FAB INDUSTRIES INC	0.28693	40.38	140.73
2250	RUSSELL CORP	0.37307	169.45	454.21
2250	SIGNAL APPAREL CO-CL A	0.39529	12.47	31.54
2250	CHAMPION PRODUCTS INC	0.44287	28.30	63.89
2250	GUILFORD MILLS INC	0.46158	150.28	325.58
2270	GALAXY CARPET MILLS	0.35431	26.70	75.35
2270	SALEM CARPET MILLS	0.38938	24.15	62.02
2270	SHAW INDUSTRIES INC	0.41914	100.60	240.02
2300	NOEL INDUSTRIES	-0.20956	-0.17	0.82
2300	MANHATTAN INDUSTRIES INC	0.02885	0.95	32.87
2300	KELLWOOD CO	0.37414	80.88	216.18
2300	PHILLIPS-VAN HEUSEN	0.41128	84.67	205.86
2300	BAYLY CORP	0.41867	16.46	39.32
2300	ANGELICA CORP	0.42210	112.28	266.00
2300	HARTMARX CORP	0.43125	270.90	628.17
2300	SUPERIOR SURGICAL MFG	0.43784	24.82	56.68
2300	OXFORD INDUSTRIES INC	0.45627	140.87	308.74
2300	HAMPTON INDUSTRIES	0.45837	31.59	68.92
2300	VF CORP	0.45887	792.39	1726.83
2300	BARCO OF CALIFORNIA	0.46414	6.85	14.76
2300	MOVIE STAR INC-CL A	0.46633	8.37	17.95
2300	GARAN INC	0.48081	84.61	175.98
2300	DECORATOR INDUSTRIES INC	0.48193	2.75	5.71
2300	WINJAK INC	0.54067	37.19	68.79
2300	SALANT CORP	1.91797	21.26	11.08
2400	LOUISIANA-PACIFIC CORP	0.20133	281.55	1398.48
2400	GEORGIA-PACIFIC CORP	0.22127	1004.31	4538.79
2400	WEYERHAEUSER CO	0.25147	1259.76	5009.53
2400	POPE & TALBOT INC	0.26482	51.54	194.61
2400	TRUS JOIST CORP	0.38884	47.71	122.70
2450	CHAMPION ENTERPRISES INC	-0.56550	-0.84	1.48
2450	REDMAN INDUSTRIES INC	-0.11298	-6.50	57.51
2450	LIBERTY HOMES-CL A	0.45348	40.10	88.44
2450	SKYLINE CORP	0.48977	117.35	239.60
2450	NOBILITY HOMES INC	0.50076	2.90	5.79
2450	ZIMMER CORP	0.78930	8.60	10.89
2450	SILVERCREST CORP	2.01225	5.40	2.68
2510	ROSPATCH CORP-DEL	0.36410	13.07	35.89
2510	PULASKI FURNITURE CORP	0.36992	17.06	46.11
2510	LA-Z-BOY CHAIR CO	0.39975	133.43	333.77
2510	ROWE FURNITURE CORP	0.40695	13.32	32.74
2510	LEGGETT & PLATT INC	0.42118	110.17	261.57
2510	BERKLINE CORP	0.42667	11.38	26.66
2510	FLEXSTEEL INDS	0.44440	50.06	112.64
2510	OHIO MATTRESS CO	0.45540	72.00	158.10
2510	MOHASCO CORP	0.46067	127.20	276.11
2510	BASSETT FURNITURE INDS	0.46309	254.55	549.68
2520	MILLER (HERMAN) INC	0.40469	165.07	407.89
2520	HAUSERMAN INC	0.40565	9.59	23.64
2520	BARRY WRIGHT CORP	0.42628	81.35	190.84

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
2520	VIRCO MANUFACTURING	0.45062	23.52	52.2
2520	HON INDUSTRIES	0.45376	169.40	373.3
2520	TAB PRODUCTS	0.46284	42.56	92.0
2590	KNAPE & VOGT MFG CO	0.42709	38.02	89.0
2590	AMERICAN LOCKER GROUP	0.55004	2.73	5.0
2600	AMERICAN ISRAELI PAPER MILLS	0.09468	10.82	114.3
2600	STONE CONTAINER CORP	0.16308	49.92	306.1
2600	JAMES RIVER CORP OF VIRGINIA	0.16311	176.25	1080.6
2600	FEDERAL PAPER BOARD CO	0.16478	68.95	418.4
2600	POTLATCH CORP	0.17746	178.80	1007.6
2600	GREAT NORTHERN NEKOOSA CORP	0.17881	291.53	1630.4
2600	UNION CAMP CORP	0.18026	477.48	2648.9
2600	CHESAPEAKE CORP	0.20086	63.46	316.0
2600	INTL PAPER CO	0.21138	1236.23	5848.3
2600	WILLAMETTE INDUSTRIES	0.23484	219.67	935.4
2600	SCOTT PAPER CO	0.23591	491.99	2085.5
2600	WESTVACO CORP	0.24061	411.36	1709.7
2600	CHAMPION INTERNATIONAL CORP	0.24695	983.40	3982.2
2600	MOSINEE PAPER CORP	0.25590	34.13	133.4
2600	LONGVIEW FIBRE CO	0.26862	130.14	484.5
2600	BOISE CASCADE CORP	0.30381	642.97	2116.3
2600	KIMBERLY-CLARK CORP	0.31756	1155.20	3637.7
2600	PENTAIR INC	0.34405	110.79	322.0
2600	GULF CANADA RESOURCES LTD	0.34557	1642.59	4753.2
2600	GLATFELTER (P.H.) CO	0.34688	196.26	565.8
2600	FORT HOWARD CORP	0.37415	860.17	2299.0
2600	CONSOLIDATED PAPERS INC	0.38052	463.60	1218.3
2600	SONOCO PRODUCTS CO	0.41083	292.83	712.8
2600	BOWATER INDS PLC-ADR	0.61449	528.66	860.3
2649	TRANZONIC COS	0.27304	6.63	24.3
2649	AVERY INTERNATIONAL	0.36093	230.96	639.9
2649	TECHNICAL TAPE INC	0.37610	19.32	51.4
2649	MINNESOTA MINING & MFG CO	0.40195	5365.00	13347.3
2649	TAMBRANDS INC	0.40734	435.98	1070.3
2649	DENNISON MFG CO	0.41978	221.22	527.0
2700	BANTA (GEORGE) INC	0.39742	78.09	196.5
2700	DE LUXE CHECK PRINTERS	0.42201	572.30	1356.1
2700	HARLAND (JOHN H.) CO	0.44544	157.22	353.0
2711	QUEBECOR INC	0.30242	35.69	118.0
2711	MEDIA GENERAL-CL A	0.30819	167.51	543.5
2711	TIMES MIRROR CO-DEL	0.36521	1381.77	3783.5
2711	NEW YORK TIMES CO-CL A	0.40253	458.04	1137.9
2711	KNIGHT-RIDDER INC	0.43266	946.73	2188.2
2711	GANNETT CO	0.44201	1637.91	3705.6
2711	WASHINGTON POST CO-CL B	0.45933	590.77	1286.2
2711	DOW JONES & CO INC	0.46281	861.07	1860.5
2711	LEE ENTERPRISES	0.53251	213.78	401.5
2721	MEREDITH CORP	0.38302	166.32	434.2
2721	COMMERCE CLEARING HOUSE INC	0.45256	285.17	630.1
2721	NATIONAL LAMPOON INC	1.00621	8.10	8.0
2731	SADLIER (WILIAM H.) INC	0.22765	1.30	5.7
2731	NELSON (THOMAS) INC	0.26875	4.90	18.2
2731	MACMILLAN INC	0.36177	155.29	429.3
2731	ADDISON-WESLEY PUBG CO-CL B	0.43815	53.92	123.1
2731	MCGRAW-HILL INC	0.46601	1085.03	2328.4

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
2731	HOUGHTON MIFFLIN CO	0.48512	147.53	304.1
2750	COURIER CORP	0.26167	16.78	64.1
2750	DONNELLEY (R.R.) & SONS CO	0.33365	654.15	1960.6
2750	SORG INC	0.36872	5.83	15.8
2750	KRUEGER (W.A.) CO	0.37438	73.20	.195.5
2750	BASIX CORP	0.40666	16.90	41.6
2750	INTL BANKNOTE	0.41353	20.61	49.8
2750	BOWNE & CO INC	0.46671	112.83	241.8
2750	SERVICE RESOURCES CORP	4.12145	61.10	14.8
2761	WALLACE COMPUTER SVCS INC	0.42247	124.08	293.7
2761	DUPLEX PRODUCTS	0.43148	84.01	194.7
2761	AMERICAN BUSINESS PRODS-GA	0.43742	72.29	165.3
2761	STANDARD REGISTER CO	0.44689	187.30	419.1
2761	MOORE CORP LTD	0.46366	1167.54	2518.1
2771	AMERICAN GREETINGS CORP-CL A	0.34145	316.97	928.3
2800	PENNWALT CORP	0.31513	235.55	747.5
2800	PPG INDUSTRIES INC	0.33371	1441.31	4319.0
2800	AMERICAN CYANAMID CO	0.33805	1100.20	3254.5
2800	UNION CARBIDE CORP	0.35035	2556.63	7297.3
2800	DOW CHEMICAL	0.35059	3559.51	10152.8
2800	OLIN CORP	0.35717	376.13	1053.1
2800	ACETO CORP	0.49134	39.63	80.7
2810	AIR PRODUCTS & CHEMICALS INC	0.23558	470.03	1995.2
2810	GREAT LAKES CHEMICAL CORP	0.28909	107.30	371.2
2810	LEARONAL INC	0.44232	57.33	129.6
2820	HERCULES INC	0.27380	603.69	2204.9
2820	REICHHOLD CHEMICALS INC	0.45065	133.83	297.0
2820	SCHULMAN (A.) INC	0.45610	88.41	193.8
2830	SYNTEX CORP	0.15540	236.46	1521.6
2830	SCHERING-PLOUGH	0.28322	1054.81	3724.3
2830	MERCK & CO	0.30073	2487.01	8269.9
2830	SQUIBB CORP	0.32099	1001.35	3119.5
2830	MARION LABORATORIES	0.41442	161.01	388.5
2830	WARNER-LAMBERT CO	0.50566	1920.95	3798.9
2834	COMNET CORP	0.17140	1.84	10.7
2834	UPJOHN CO	0.29816	831.77	2789.7
2834	ABBOTT LABORATORIES	0.30274	1519.80	5020.2
2834	PFIZER INC	0.31827	1992.56	6260.5
2834	LILLY (ELI) & CO	0.33726	2608.91	7735.6
2834	ZENITH LABORATORIES INC	0.36060	12.06	33.4
2834	GLAXO HOLDING PLC-ADR	0.36357	1208.86	3325.0
2834	JOHNSON & JOHNSON	0.38106	2959.08	7765.4
2834	CARTER-WALLACE INC	0.41731	120.19	288.0
2834	AMERICAN HOME PRODUCTS CORP	0.42521	4867.81	11447.9
2834	STERLING DRUG INC	0.43284	1240.74	2866.5
2834	SHAKLEE CORP	0.47308	234.30	495.3
2834	IROQUOIS BRANDS LTD	0.51503	30.62	59.4
2834	SCHERER (R.P.)	0.77207	139.27	180.4
2834	ROBINS (A.H.) CO	0.94769	354.21	373.8
2841	STEPAN CO	0.22007	28.73	130.6
2841	PROCTER & GAMBLE CO	0.36844	5653.96	15345.9
2841	CLOROX CO-DEL	0.39169	468.89	1197.1
2841	ECOLAB INC	0.39692	229.23	577.5
2841	COLGATE-PALMOLIVE CO	0.42954	1627.72	3789.5
2841	CHEMED CORP	0.44972	261.63	581.8

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
2841	OAKITE PRODUCTS	0.485008	46.85	96.6
2841	STANHOME INC	0.495442	163.72	330.4
2841	NCH CORP	0.497996	254.53	511.1
2844	BLOCK DRUG-CL A	0.230126	74.46	323.6
2844	CHATTEM INC	0.330341	27.26	82.5
2844	ALBERTO-CULVER CO	0.376909	41.34	109.7
2844	INTL FLAVORS & FRAGRANCES	0.401231	523.72	1305.3
2844	LAMAUR INC	0.423723	22.27	52.6
2844	REDKEN LABORATORIES	0.436741	49.05	112.3
2844	NOXELL CORP-CL B	0.464402	207.89	447.6
2844	MEM CO	0.470002	42.05	89.5
2844	NEUTROGENA CORP	0.486115	36.29	74.7
2844	LEE PHARMACEUTICALS	0.583719	8.31	14.2
2844	JOHNSON PRODUCTS	0.618048	18.33	29.7
2850	GUARDSMAN PRODUCTS INC	0.379110	15.12	39.9
2850	GROW GROUP INC	0.402244	46.10	114.6
2850	RPM INC-OHIO	0.404076	64.10	158.6
2850	VALSPAR CORP	0.437319	64.71	148.0
2850	PRATT & LAMBERT INC	0.461521	46.71	101.2
2860	FIRST MISSISSIPPI CORP	0.365500	114.95	314.5
2860	CROMPTON & KNOWLES CORP	0.419747	61.15	145.7
2870	INTL MINERALS & CHEMICAL	0.316368	621.20	1963.5
2890	DIAMOND CRYSTAL SALT CO	0.241619	24.73	102.4
2890	CABOT CORP	0.276587	340.80	1232.1
2890	LOCTITE CORP	0.278958	86.75	311.0
2890	KINARK CORP	0.302155	6.78	22.5
2890	LAWTER INTERNATIONAL INC	0.367338	80.82	220.0
2890	PETROLITE CORP	0.377013	161.88	429.4
2890	ETHYL CORP	0.382165	760.59	1990.2
2890	LUBRIZOL CORP	0.392135	643.23	1640.3
2890	DEXTER CORP	0.399811	207.84	519.9
2890	PRODUCTS RESEARCH & CHEMICAL	0.408591	34.33	84.0
2890	BETZ LABORATORIES INC	0.420645	247.60	588.6
2890	FERRO CORP	0.435795	213.04	488.8
2890	NALCO CHEMICAL CO	0.441910	578.16	1308.3
2890	FULLER (H. B.) CO	0.448316	107.71	240.3
2890	DETREX CORP	0.449694	38.30	85.2
2890	MACDERMID INC	0.453576	49.18	108.4
2890	WD-40 CO	0.505179	82.43	163.2
2890	NL INDUSTRIES	0.571153	570.60	999.0
2911	TOTAL PETROLEUM OF N AMERICA	0.056589	16.98	300.0
2911	PACIFIC RESOURCES INC	0.078694	20.46	260.0
2911	PENNZOIL CO	0.190308	627.32	3296.3
2911	AMERICAN PETROFINA-CL A	0.198471	180.39	908.9
2911	HUSKY OIL LTD	0.201491	271.59	1347.9
2911	MAPCO INC	0.235913	430.09	1823.1
2911	CROWN CENTRAL PETROLEUM CP-A	0.284404	75.52	265.5
2911	IMPERIAL OIL LTD-CL A	0.307576	2437.43	7924.6
2911	UNOCAL CORP	0.316036	3496.83	11064.7
2911	HOLLY CORP	0.334562	68.79	205.6
2911	SUN CO INC	0.339900	4052.65	11923.0
2911	QUAKER STATE CORP	0.341743	253.35	741.3
2911	PAULEY PETROLEUM INC	0.345975	7.96	23.0
2911	STANDARD OIL CO	0.358695	7371.07	20549.7
2911	KERR-MCGEE CORP	0.377849	939.78	2487.2

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
2911	MAXUS ENERGY CORP	0.39601	781.5	1974
2911	AMOCO CORP	0.41462	15936.3	38436
2911	QUAKER CHEMICAL CORP	0.44657	65.6	147
2911	EXXON CORP	0.52947	64990.5	122746
2911	USX CORP	0.56000	7533.9	13453
2911	ASAMERA INC	0.60651	121.7	201
2911	ROYAL DUTCH PETE-NY GLDR 10	0.62551	37376.5	59754
2911	AMERADA HESS CORP	0.67881	5587.8	8232
2911	TESORO PETROLEUM CORP	0.73145	208.1	284
2911	MURPHY OIL CORP	0.78353	2404.4	3069
2950	GAF CORP	-0.90788	-183.2	202
3000	GOODYEAR TIRE & RUBBER CO	0.37108	2406.5	6485
3000	COOPER TIRE & RUBBER	0.39492	122.7	311
3000	ARMTEK CORP	0.41558	61.8	149
3000	BANDAG INC	0.48448	375.1	774
3000	CARLISLE COS INC	0.49922	233.9	469
3000	GOODRICH (B.F.) CO	0.67679	356.0	526
3000	ALLIANCE TIRE & RUBBER CO-A	2.40404	28.8	12
3069	VULCAN CORP	0.32355	14.0	43
3069	WEST CO INC	0.40110	85.5	213
3079	WALTER (JIM) CORP	0.20461	355.1	1735
3079	CONSTAR INTERNATIONAL INC	0.24795	36.5	147
3079	BEMIS CO	0.27306	101.9	373
3079	SUSQUEHANNA CORP	0.29450	18.5	63
3079	O'SULLIVAN CORP	0.31937	44.8	140
3079	RAYCHEM CORP	0.33542	175.2	522
3079	ELDON INDUSTRIES INC	0.35803	20.1	56
3079	REXHAM CORP	0.37241	67.6	182
3079	ARMSTRONG WORLD INDS INC	0.39480	615.9	1560
3079	GUARDIAN PACKAGING CORP	0.39484	10.7	27
3079	BLESSINGS CORP	0.40661	23.8	59
3079	THETFORD CORP	0.41674	8.2	20
3079	SEALED AIR CORP	0.41942	67.0	160
3079	RUBBERMAID INC	0.42593	304.4	715
3079	CHELSEA INDUSTRIES INC	0.45277	49.0	108
3079	MARTIN PROCESSING INC	0.50626	35.4	70
3079	AMERICAN BILTRITE INC	0.57707	18.9	33
3079	ENVIRODYNE INDUSTRIES INC	0.68619	83.9	122
3140	STRIDE RITE CORP	0.34376	69.8	203
3140	LAMA (TONY) CO	0.38938	19.6	50
3140	WOLVERINE WORLD WIDE	0.39223	47.6	121
3140	PENOBSCOT SHOE	0.45164	6.2	14
3140	BROWN GROUP INC	0.46072	466.5	1012
3140	SHAER SHOE CORP	0.48146	11.9	25
3140	SUAVE SHOE CORP	0.49845	20.5	41
3140	BARRY (R.G.)	0.57068	16.5	29
3199	SETON CO	0.35053	22.6	64
3199	JACLYN INC	0.42322	19.0	45
3199	SWANK INC	0.45613	67.5	148
3210	AFG INDUSTRIES INC	0.33114	75.8	229
3221	LANCASTER COLONY CORP	0.41551	96.2	231
3221	CORNING GLASS WORKS	0.42058	522.1	1241
3241	MOORE MCCORMACK RESOURCES	-0.18627	-41.6	223
3241	TEXAS INDUSTRIES INC	0.07907	19.7	250
3241	SOUTHDOWN INC	0.11762	46.7	397

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
3241	LONE STAR INDUSTRIES	0.1655	126.40	763.93
3250	SIKES CORP-CL A	0.1489	6.88	46.20
3270	RANGAIRE CORP	0.2671	11.41	42.71
3270	ATLAS CORP	0.2743	14.32	52.20
3270	AMERON INC-DEL	0.3083	42.32	137.26
3270	FLORIDA ROCK INDS	0.3282	73.06	222.60
3270	USG CORP	0.3829	959.67	2506.43
3290	CERTAIN-TEED CORP	0.3359	205.83	612.72
3290	MANVILLE CORP	0.3916	604.52	1543.81
3290	OWENS-CORNING FIBERGLAS CORP	0.3961	639.74	1615.26
3290	FLUOROCARBON CO	0.4331	31.42	72.55
3290	SUPRADUR COS INC	0.4899	6.37	13.01
3290	NORTON CO	0.5569	436.50	783.73
3310	FLORIDA STEEL CORP	0.2107	37.88	179.83
3310	INLAND STEEL INDUSTRIES INC	0.2260	135.57	599.98
3310	CARPENTER TECHNOLOGY	0.3391	236.38	696.97
3310	CYCLOPS CORP	0.3753	96.87	258.14
3310	QUANEX CORP	0.3764	40.40	107.35
3310	NUCOR CORP	0.3837	260.26	678.23
3310	WORTHINGTON INDUSTRIES	0.4108	217.82	530.30
3310	NATIONAL-STANDARD CO	0.4251	56.83	133.69
3310	ATHLONE INDS	0.4483	56.23	125.44
3310	NORTHWESTERN STEEL & WIRE CO	0.4598	126.85	275.89
3310	VALLEY INDUSTRIES	0.5008	32.57	65.03
3310	FOOTE MINERAL CO	0.5473	18.43	33.67
3310	PROLER INTERNATIONAL CORP	1.0575	46.93	44.38
3310	ARMCO INC	2.2717	542.35	238.74
3310	EASTMET CORP	3.2658	56.37	17.26
3320	PRECISION CASTPARTS CORP	0.3258	37.64	115.54
3320	AMCAST INDL CORP	0.3834	25.68	67.00
3320	OVERMYER CORP	0.6786	11.37	16.75
3330	ALUMINUM CO OF AMERICA	0.3025	1011.84	3344.91
3330	ALCAN ALUMINIUM LTD	0.3274	1231.77	3761.88
3330	BRUSH WELLMAN INC	0.3599	136.14	378.30
3330	REYNOLDS METALS CO	0.3754	375.32	999.70
3330	O'OKIEP COPPER CO-ADR	0.3919	12.50	31.89
3330	KAISERTECH LTD	0.7102	217.38	306.09
3350	ARMADA CORP	0.3578	9.08	25.38
3350	HANDY & HARMAN	0.4070	123.48	303.38
3390	LINDBERG CORP	0.4011	26.58	66.26
3410	PEERLESS TUBE CO	0.2573	7.16	27.83
3410	BALL CORP	0.3075	209.97	682.89
3410	CROWN CORK & SEAL CO INC	0.4160	583.54	1402.87
3410	VAN DORN CO	0.4216	81.14	192.44
3410	ORMAND INDUSTRIES	19.4316	2.05	0.11
3429	VERMONT AMERICAN-CL A	0.3932	88.69	225.57
3429	STANLEY WORKS	0.4048	457.81	1131.07
3429	EASTERN CO	0.4263	23.04	54.04
3429	ACME UNITED CORP	0.4383	18.72	42.71
3429	GILLETTE CO	0.4465	1157.10	2591.32
3429	STARRETT (L.S.) CO	0.4689	111.79	238.42
3429	SERVOTRONICS INC	0.7001	5.60	8.00
3430	STANADYNE INC	0.3959	191.44	483.56
3440	TRINITY INDUSTRIES	0.2217	53.05	239.25
3440	HARSCO CORP	0.4503	474.05	1052.70

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
3442	INTL ALUMINUM	0.45715	73.33	160.41
3443	DELTAK CORP	0.13972	0.81	5.81
3443	MUELLER (PAUL) CO	0.42542	28.29	66.51
3443	GRAHAM CORP	0.44343	5.98	13.48
3443	CBI INDUSTRIES INC	0.46108	434.59	942.53
3443	PITT-DES MOINES INC	0.53524	65.52	122.42
3444	VALMONT INDUSTRIES	0.40061	33.55	83.75
3444	ROBERTSON (H.H.) CO	0.55053	134.80	244.86
3448	UNION CORP	1.00593	28.99	28.82
3452	BUELL INDUSTRIES INC	0.31481	23.37	74.24
3452	SPS TECHNOLOGIES INC	0.35782	72.20	201.78
3452	FEDERAL SCREW WORKS	0.42394	17.05	40.21
3452	PENN ENGINEERING & MFG CORP	0.45509	42.56	93.51
3460	PARK-OHIO INDUSTRIES	0.21571	25.95	120.29
3460	HEXCEL CORP	0.34624	34.51	99.68
3460	KIDDE INC	0.36584	466.81	1275.99
3460	WYMAN-GORDON CO	0.41025	264.05	643.64
3460	VARLEN CORP	0.44232	46.78	105.76
3460	HOWELL INDUSTRIES INC	0.46047	16.45	35.73
3460	SIFCO INDUSTRIES	0.47128	11.83	25.10
3460	GENERAL HOUSEWARES	0.48278	14.86	30.79
3460	ZERO CORP	0.50022	81.94	163.82
3480	TRANSTECHNOLOGY CORP	0.41945	51.62	123.08
3480	STURM, RUGER & CO INC	0.51568	105.57	204.72
3494	PARKER-HANNIFIN CORP	0.39208	472.13	1204.18
3499	DOUGLAS & LOMASON CO	0.39832	23.25	58.36
3499	BARNES GROUP INC	0.50610	172.90	341.63
3499	SYNALLOY CORP	0.54818	9.72	17.72
3510	OUTBOARD MARINE CORP	0.35110	236.09	672.44
3510	BRIGGS & STRATTON	0.43950	390.42	888.33
3510	BRUNSWICK CORP	0.44478	684.72	1539.46
3520	DEERE & CO	0.35422	761.59	2150.03
3520	MURRAY OHIO MFG CO	0.41723	78.12	187.24
3520	ART'S WAY MANUFACTURING INC	0.60685	7.49	12.34
3530	DRESSER INDUSTRIES INC	0.48088	1404.46	2920.63
3530	BECOR WESTERN INC	0.59208	258.28	436.22
3531	CATERPILLAR INC	0.36386	1706.50	4690.00
3531	PORTEC INC	0.50156	40.86	81.47
3531	NORTHWEST ENGINEERING CO	2.16364	12.06	5.57
3533	CAMCO INC	0.39119	55.99	143.12
3533	BAKER-HUGHES INC	0.41106	599.49	1458.42
3533	CAMERON IRON WORKS	0.48297	427.86	885.89
3533	SMITH INTERNATIONAL INC	1.06434	298.60	280.55
3533	WEATHERFORD INTERNATIONAL	2.08117	67.26	32.32
3537	CASCADE CORP	0.37957	35.93	94.65
3537	RAYMOND CORP	0.48979	47.78	97.55
3540	BROWN & SHARPE MFG CO	0.12056	6.63	54.97
3540	CINCINNATI MILACRON INC	0.36015	167.49	465.06
3540	BLACK & DECKER CORP	0.40202	335.14	833.66
3540	REGAL BELOIT	0.42762	27.82	65.06
3540	KENNAMETAL INC	0.43529	201.11	462.01
3540	MONARCH MACHINE TOOL CO	0.46807	69.48	148.44
3540	ACME-CLEVELAND CORP	0.56652	42.36	74.76
3540	WEAN INC-PA	8.97698	33.00	3.68
3550	IONICS INC	0.12965	5.31	40.99

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
3550	COMPUGRAPHIC CORP	0.15065	30.34	201.41
3550	ENTWISTLE CO	0.35087	11.90	33.91
3550	NEWCOR INC	0.40150	14.18	35.33
3550	KULICKE & SOFFA INDUSTRIES	0.41114	22.91	55.73
3550	PNEUMATIC SCALE CORP	0.41927	8.36	19.94
3550	MATERIALS RESEARCH	0.57959	9.06	15.63
3550	HARNISCHFEGER INDUSTRIES INC	0.59472	90.42	152.04
3550	VELOBIND INC	0.62126	10.05	16.17
3558	ZURN INDUSTRIES INC	0.40829	138.74	339.81
3560	PALL CORP	0.27156	99.46	366.27
3560	PEERLESS MFG CO	0.35728	8.57	23.98
3560	TENNEY ENGINEERING INC	0.35912	4.84	13.48
3560	INGERSOLL-RAND CO	0.38102	867.92	2277.91
3560	HEIN-WERNER CORP	0.38724	6.10	15.76
3560	GOULDS PUMPS INC	0.39155	140.81	359.63
3560	FARR CO	0.40237	13.31	33.07
3560	SAFEGUARD SCIENTIFICS INC	0.40592	11.72	28.87
3560	DURIRON CO INC	0.42837	60.04	140.16
3560	BARDEN CORP	0.44131	50.30	113.98
3560	COMMERCIAL SHEARING INC	0.44578	122.91	275.72
3560	GORMAN-RUPP CO	0.46164	55.13	119.42
3560	TWIN DISC INC	0.46371	68.45	147.62
3560	TIMKEN CO	0.47221	618.37	1309.53
3560	BINKS MFG CO	0.47319	77.69	164.19
3560	GRACO INC	0.49174	83.18	169.14
3560	MILTON ROY CO	0.49287	21.84	44.31
3560	DONALDSON CO INC	0.49699	118.50	238.45
3560	SALEM CORP	0.52752	20.32	38.51
3560	SELAS CORP OF AMERICA	1.16088	6.00	5.17
3570	DATA CARD CORP	0.28283	20.83	73.65
3570	PITNEY-BOWES INC	0.30082	457.56	1521.06
3570	ROCKAWAY CORP	0.40730	24.67	60.57
3570	GENERAL BINDING CORP	0.40974	51.22	124.99
3580	TENNANT CO	0.41729	75.33	180.52
3580	TOKHEIM CORP	0.42070	66.90	159.03
3580	STANDEX INTERNATIONAL CORP	0.42606	151.82	356.34
3580	TECUMSEH PRODUCTS CO	0.45282	521.88	1152.52
3580	MANITOWOC CO	0.47332	182.97	386.57
3580	LSB INDUSTRIES INC	1.20046	24.70	20.57
3590	SEALED POWER	0.37840	178.16	470.81
3590	TRINOVA CORP	0.39266	491.16	1250.84
3600	WESTINGHOUSE ELECTRIC CORP	0.23588	1231.93	5222.80
3600	NORTH AMERICAN PHILIPS CORP	0.36769	589.14	1602.27
3610	COMPUTER PRODUCTS INC	0.33025	8.98	27.19
3610	R T E CORP	0.42651	81.83	191.87
3620	AMETEK INC	0.33064	202.37	612.05
3620	SUPERIOR ELECTRIC CO	0.41359	7.72	18.66
3620	ACME ELECTRIC CORP	0.44136	20.69	46.89
3620	FRANKLIN ELECTRIC CO INC	0.45509	31.22	68.60
3622	CONCHEMCO INC	0.51318	9.17	17.88
3630	MOR-FLO INDS	0.23378	11.65	49.82
3630	NATIONAL PRESTO INDS INC	0.39993	134.22	335.62
3630	REECE CORP	0.45569	23.24	51.00
3630	HEALTH-MOR INC	0.45788	24.19	52.83
3630	WHIRLPOOL CORP	0.45842	1271.21	2773.01

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
3630	PREWAY INC	1.11701	21.6	19.3
3640	STERNER LIGHTING SYSTEMS	0.34481	4.1	12.0
3640	NATIONAL SERVICE INDS INC	0.36911	375.8	1018.1
3640	BAIRNCO CORP	0.39937	140.0	350.6
3640	SLATER ELECTRIC INC	0.41057	10.8	26.2
3640	HIGH VOLTAGE ENGINEERING	0.43289	31.7	73.2
3640	THOMAS INDUSTRIES INC	0.44303	107.5	242.7
3640	JOSLYN CORP	0.44755	104.8	234.1
3640	WOODHEAD INDUSTRIES INC	0.45559	33.6	73.8
3640	SL INDS INC	0.46232	27.9	60.3
3640	DURO-TEST CORP	0.48136	50.4	104.7
3651	EMERSON RADIO	0.19105	21.8	114.3
3651	VERIT INDUSTRIES	0.27708	0.9	3.4
3651	ZENITH ELECTRONICS CORP	0.39681	197.6	498.1
3651	SONY CORP-ADR	0.55411	2670.5	4819.5
3651	PIONEER ELECTRONIC CORP-ADR	0.64734	838.5	1295.3
3651	AUDIOTRONICS CORP	0.71839	4.3	6.0
3651	MATSUSHITA ELECTRIC INDL-ADR	0.76118	12185.6	16008.7
3661	NORTHERN TELECOM LTD	0.19559	432.2	2209.7
3661	PLESSEY PLC-ADR	0.39395	713.3	1810.6
3663	TIMEPLEX INC	0.15192	8.0	52.7
3663	GENERAL DATACOMM INDS INC	0.26226	11.1	42.5
3663	SCIENTIFIC-ATLANTA INC	0.31932	44.3	138.7
3663	DYNASCAN CORP	0.35025	18.0	51.3
3663	TRW INC	0.36727	1458.6	3971.6
3663	SUNAIR ELECTRONICS INC	0.40357	18.0	44.6
3663	CALIFORNIA MICROWAVE INC	0.45942	29.6	64.3
3663	REGENCY ELECTRONICS INC	0.48456	58.3	120.4
3664	LORAL CORP	0.25549	140.1	548.5
3664	E-SYSTEMS INC	0.33659	213.9	635.5
3664	RAYTHEON CO	0.34509	1792.4	5193.9
3664	WATKINS-JOHNSON	0.38580	86.2	223.5
3664	LEAR SIEGLER INC	0.47280	655.8	1387.1
3664	COMPUDYNE CORP	0.49583	16.1	32.4
3664	STEWART-WARNER CORP	0.49673	164.1	330.4
3664	SINGER CO	2.85799	161.8	56.6
3665	UNITED INDUSTRIAL CORP	0.18053	34.6	191.8
3665	CUBIC CORP	0.38418	81.2	211.4
3666	KNOGO CORP	0.23635	8.8	37.3
3666	SENSORMATIC ELECTRONICS	0.24413	37.3	152.8
3666	PITTWAY CORP	0.36247	208.5	575.3
3670	TALLEY INDUSTRIES INC	0.36737	66.8	181.9
3670	SFE TECHNOLOGIES	0.84487	10.5	12.5
3674	ADVANCED MICRO DEVICES	0.26336	60.7	230.7
3674	ANALOG DEVICES	0.29561	65.9	223.0
3674	ALPHA INDS	0.30329	12.4	41.0
3674	SILICONIX INC	0.32641	26.0	79.6
3674	INTL RECTIFIER CORP	0.32996	16.4	49.7
3674	M/A-COM INC	0.37346	148.6	398.0
3674	INTEL CORP	0.43027	501.5	1165.6
3674	NATIONAL SEMICONDUCTOR CORP	0.52189	264.1	506.0
3674	TEXAS INSTRUMENTS INC	0.57016	1307.7	2293.5
3674	DREXLER TECHNOLOGY CORP	0.99291	3.1	3.1
3679	ROGERS CORP	0.11294	4.4	39.1
3679	PARK ELECTROCHEMICAL CORP	0.24356	11.1	45.6

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
3679	GENERAL MICROWAVE CORP	0.29533	3.8	12.9
3679	KEARNEY NATIONAL INC	0.34996	16.2	46.3
3679	KOLLMORGEN CORP	0.35175	33.5	95.3
3679	DATA DESIGN LABORATORIES	0.36683	18.9	51.4
3679	WASHINGTON SCIENTIFIC INDS	0.36813	7.7	21.0
3679	MATEC CORP	0.37902	5.6	14.8
3679	AUGAT INC	0.38303	96.2	251.2
3679	METHODE ELECTRONICS INC-CL B	0.40660	20.4	50.2
3679	ESPEY MFG & ELECTRONICS CORP	0.41665	11.8	28.4
3679	THOMAS & BETTS CORP	0.41916	263.8	629.3
3679	AMP INC	0.42551	1152.4	2708.3
3679	AMERICAN PRECISION INDS	0.46956	18.7	39.8
3679	MOLEX INC	0.47067	190.8	405.3
3679	BURNDY CORP	0.48719	156.2	320.7
3679	VEECO INSTRUMENTS	0.53850	93.9	174.4
3680	WANG LABORATORIES-CL B	0.16385	145.3	886.8
3680	DIGITAL EQUIPMENT	0.28877	1370.3	4745.5
3680	UNISYS CORP	0.46800	1829.8	3909.9
3680	CONTROL DATA CORP	1.44258	417.6	289.4
3681	TITAN CORP	0.29615	17.0	57.4
3681	SCI SYSTEMS INC	0.31321	31.5	100.6
3681	TANDY CORP	0.46459	1606.6	3458.1
3683	TELEX CORP	0.41649	213.7	513.0
3683	MEGADATA CORP	0.42075	4.7	11.1
3683	INFORMATION INTERNATIONAL	0.43320	18.5	42.8
3683	DIEBOLD INC	0.44050	271.9	617.2
3683	TEC INC	0.49737	4.5	9.1
3683	ICOT CORP	1.25636	11.7	9.3
3686	GERBER SCIENTIFIC INC	0.36699	66.8	182.0
3686	COMPUTERVISION CORP	0.42382	68.1	160.8
3686	ADAGE INC	1.52481	3.0	2.0
3687	BOLT BERANEK & NEWMAN INC	0.23454	19.4	82.8
3687	DATAPOINT CORP	0.43810	102.7	234.4
3688	DATAPRODUCTS CORP	0.27723	55.5	200.4
3689	APPLIED MAGNETICS CORP	0.34895	31.1	89.1
3689	ANALOGIC CORP	0.36796	53.5	145.4
3689	ANDERSON JACOBSON INC	1.28412	11.8	9.2
3693	MEDTRONIC INC	0.26806	182.6	681.3
3693	DATASCOPE CORP	0.37596	13.1	34.7
3699	ARROW AUTOMOTIVE INDUSTRIES	0.44421	22.4	50.4
3699	WATERS INSTRUMENT INC	0.46531	3.2	6.9
3699	CHAMPION SPARK PLUG	0.48314	470.2	973.3
3711	CHRYSLER CORP	0.18741	904.6	4826.9
3711	FEDERAL SIGNAL CORP	0.37356	69.7	186.7
3711	GENERAL MOTORS CORP	0.39235	17974.2	45811.6
3711	FORD MOTOR CO	0.39414	7637.0	19376.2
3711	PACCAR INC	0.45314	642.6	1418.0
3711	HONDA MOTOR LTD-ADR	0.52636	4039.6	7674.5
3713	KRUG INTERNATIONAL CORP	0.30635	2.3	7.5
3713	FRUEHAUF CORP-CL B	0.57923	246.1	424.8
3714	CHAMPION PARTS REBUILDERS	0.25364	4.3	17.1
3714	TRICO PRODUCTS CORP	0.26335	24.2	92.0
3714	SUPERIOR INDUSTRIES INTL	0.30657	15.2	49.7
3714	ECHLIN INC	0.37745	207.8	550.4
3714	EATON CORP	0.38665	1014.5	2623.9

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
3714	SIMPSON INDUSTRIES	0.38851	43.44	111.81
3714	ARVIN INDUSTRIES INC	0.39639	193.40	487.92
3714	HASTINGS MFG CO	0.41292	15.90	38.50
3714	STANDARD PRODUCTS CO	0.41917	96.85	231.05
3714	WYNN'S INTERNATIONAL INC	0.42395	55.75	131.51
3714	ILLINOIS TOOL WORKS	0.45550	427.23	937.93
3714	DANA CORP	0.46104	1284.20	2785.44
3714	CLARK (J.L.) MANUFACTURNG CO	0.48749	152.42	312.67
3714	EAGLE-PICHER INDS	0.59176	174.15	294.29
3716	COACHMEN INDUSTRIES INC	0.43725	55.77	127.54
3716	FLEETWOOD ENTERPRISES	0.47322	266.95	564.12
3720	TRE CORP	0.41900	82.44	196.75
3720	HEICO CORP	0.43168	20.75	48.08
3720	TELEDYNE INC	0.44552	1876.40	4211.68
3721	GENERAL DYNAMICS CORP	0.02917	108.07	3705.04
3721	NORTHROP CORP	0.06102	97.04	1590.34
3721	BOEING CO	0.08347	602.30	7216.19
3721	GRUMMAN CORP	0.18376	186.90	1017.11
3721	MCDONNELL DOUGLAS CORP	0.20713	854.22	4124.01
3721	WHITEHALL CORP	0.30035	28.36	94.43
3721	RAVEN INDUSTRIES INC	0.39827	12.60	31.63
3721	GATES LEARJET CORP	0.48657	79.97	164.35
3728	ROHR INDUSTRIES	0.17042	44.35	260.24
3728	MOOG INC-CL A	0.29578	32.57	110.11
3728	OEA INC	0.45458	24.75	54.44
3728	CURTISS-WRIGHT CORP	0.49021	205.37	418.94
3728	KAMAN CORP-CL A	0.49102	126.44	257.51
3730	TODD SHIPYARDS CORP	0.56089	116.99	208.57
3740	SERVO CORP OF AMERICA	0.35718	2.16	6.06
3750	HUFFY CORP	0.40726	35.36	86.81
3760	MARTIN MARIETTA CORP	0.07929	186.40	2350.83
3790	KIT MANUFACTURING	0.77631	1.51	1.94
3811	GELMAN SCIENCES INC	0.28050	6.86	24.44
3811	ORION RESEARCH INC	0.29799	3.17	10.65
3811	SEQUA CORP-CL A	0.30370	156.85	516.46
3811	MILLIPORE CORP	0.33558	124.90	372.19
3811	KEWAUNEE SCIENTIFIC CP	0.33985	7.82	23.00
3811	SPECTRA-PHYSICS	0.37764	22.19	58.77
3811	COHERENT INC	0.46465	27.98	60.22
3822	MARK CONTROLS	0.22280	17.45	78.33
3822	RANCO INC	0.33811	33.84	100.09
3822	JOHNSON CONTROLS INC	0.37286	611.58	1640.26
3823	HACH CO	0.36874	11.02	29.90
3823	RESEARCH INC	0.43022	12.28	28.54
3823	FOXBORO CO	0.44459	205.88	463.09
3823	ESTERLINE CORP	0.45195	97.68	216.13
3823	MOORE PRODUCTS CO	0.45271	43.98	97.15
3825	TERADYNE INC	0.27127	56.68	208.95
3825	TEKTRONIX INC	0.28723	350.42	1219.98
3825	ALLEN GROUP	0.34884	36.46	104.52
3825	FLUKE (JOHN) MFG CO	0.35855	65.76	183.42
3825	HIPOTRONICS INC	0.40018	10.60	26.50
3825	SUN ELECTRIC CORP	0.87641	28.00	31.95
3825	COMPUTER AUTOMATION INC	1.11840	14.08	12.59
3829	INSTRON CORP	0.33038	13.22	40.03

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
3829	PERKIN-ELMER CORP	0.45057	510.11	1132.15
3829	NUCLEAR DATA	1.50003	5.22	3.48
3830	BAIRD CORP	0.24383	3.52	14.43
3830	OPTICAL COATING LABORATORIES	0.31058	16.08	51.77
3830	VARO INC	0.37060	42.11	113.63
3830	FINNIGAN CORP	0.52137	14.03	26.91
3841	BECTON, DICKINSON & CO	0.30546	388.62	1272.25
3841	COBE LABORATORIES INC	0.41187	43.43	105.45
3841	BARD (C.R.) INC	0.42507	222.40	523.21
3842	EVEREST & JENNINGS INTL-CL A	0.39942	38.14	95.48
3842	MINE SAFETY APPLIANCES CO	0.41093	159.68	388.59
3842	PURITAN-BENNETT CORP	0.41735	38.92	93.26
3851	OPTICAL RADIATION CORP	0.33581	22.13	65.89
3861	HORIZONS RESEARCH INC	0.21194	1.06	5.02
3861	VISUAL GRAPHICS-CL B	0.35588	7.43	20.87
3861	POLAROID CORP	0.42411	598.70	1411.67
3861	XEROX CORP	0.53215	4808.06	9035.25
3861	FUJI PHOTO FILM LTD-ADR	0.60191	2649.11	4401.18
3931	ALLEN ORGAN CO-CL B	0.48866	29.25	59.86
3940	COLEMAN CO INC	0.39516	150.40	380.61
3940	WOODSTREAM CORP	0.40139	10.07	25.09
3940	FUQUA INDUSTRIES INC	0.43084	309.31	717.94
3940	OHIO ART CO	0.44825	9.20	20.52
3940	PROGROUP INC	0.45576	10.73	23.54
3940	HASBRO INC	0.49219	421.40	856.18
3950	HUNT MFG	0.43840	47.06	107.34
3990	TRANS-LUX CORP	0.29768	8.71	29.26
3990	HILLENBRAND INDUSTRIES	0.41967	278.62	663.90
3990	AMERICAN FILTRONA CORP	0.47415	64.23	135.46
3990	BIC CORP	0.48456	153.75	317.30
4011	CNW CORP	-0.05002	-11.27	225.24
4011	UNION PACIFIC CORP	0.06355	327.10	5146.98
4011	KANSAS CITY SOUTHERN INDS	0.06387	17.96	281.19
4011	SOO LINE CORP	0.12251	32.20	262.83
4011	FLORIDA EAST COAST INDS	0.17322	68.38	394.75
4011	SANTA FE SOUTHERN PACIFIC CP	0.19063	751.68	3943.17
4011	NORFOLK SOUTHERN CORP	0.21056	1270.31	6033.00
4131	GREYHOUND CORP	0.46512	732.45	1574.75
4210	ARKANSAS BEST CORP	0.19444	27.22	139.99
4210	FROZEN FOOD EXPRESS INDS	0.19938	6.00	30.10
4210	CAROLINA FREIGHT CORP	0.21524	31.02	144.14
4210	YELLOW FREIGHT SYSTEM-DEL	0.23358	184.39	789.39
4210	PRESTON CORP	0.30558	46.51	152.20
4210	CHEMICAL LEAMAN CORP	0.31475	11.35	36.06
4210	LYNDEN INC	0.33087	18.77	56.74
4210	TRI-STATE MOTOR TRANSIT	0.37075	10.90	29.39
4210	ROADWAY SERVICES INC	0.38136	567.86	1489.04
4210	CONSOLIDATED FREIGHTWAYS INC	0.38860	528.85	1360.92
4210	U S TRUCK LINES INC-DEL	0.39916	51.75	129.65
4210	IU INTERNATIONAL CORP	0.42207	333.36	789.82
4400	SEA CONTAINERS LTD	0.01341	4.69	349.64
4400	OGLEBAY NORTON CO	0.04927	9.85	199.92
4400	OVERSEAS SHIPHOLDING GROUP	0.10672	76.34	715.32
4400	ALEXANDER & BALDWIN INC	0.16729	135.69	811.06
4400	TIDEWATER INC	0.47193	168.48	357.00

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
4511	KLM ROYAL DUTCH AIRLINES	0.00000	0.00	497.7
4511	USAIR GROUP	0.05749	59.90	1041.9
4511	PIEDMONT AVIATION INC	0.08834	43.38	491.1
4511	NWA INC	0.09227	84.81	919.2
4511	DELTA AIR LINES INC	0.13503	257.40	1906.2
4511	ALLEGIS CORP	0.30347	405.08	1334.8
4700	GATX CORP	0.19348	126.72	654.9
4700	AIRBORNE FREIGHT CORP	0.31044	54.21	174.6
4700	EMERY AIR FREIGHT CORP	0.41313	165.39	400.3
4700	REX-NORECO INC	0.57887	2.94	5.1
4811	PHILIPPINE LONG DISTANCE TEL	0.00000	0.00	389.0
4811	AMERICAN TELE & TELEGRAPH	0.05716	4596.85	80426.4
4811	CENTURY TELEPHONE ENTERPRISE	0.07526	10.36	137.6
4811	CINCINNATI BELL INC	0.15443	134.11	868.4
4811	GTE CORP	0.19829	2824.86	14246.4
4811	CENTEL CORP	0.21675	451.23	2081.8
4811	SOUTHERN NEW ENG TELECOMM	0.22304	473.87	2124.6
4811	LINCOLN TELECOMMUNICATIONS	0.32153	83.60	260.0
4830	TAFT BROADCASTING CO	0.33040	164.92	499.2
4830	MULTIMEDIA INC	0.40731	192.97	473.8
4830	LIN BROADCASTING	0.42020	204.24	486.1
4830	CBS INC	0.42793	1767.09	4129.4
4891	TELE-COMMUNICATIONS INC-CL A	0.03313	10.94	330.2
4891	ADAMS RUSSELL	0.18813	15.37	81.7
4891	VIACOM INTERNATIONAL	0.22428	64.13	285.9
4911	BANGOR HYDRO-ELEC CO	-0.14420	-10.54	73.1
4911	PUBLIC SERVICE CO OF N H	-0.07296	-52.70	722.3
4911	KANSAS GAS & ELECTRIC	-0.05084	-49.22	968.1
4911	PUGET SOUND POWER & LIGHT	-0.03974	-45.82	1152.9
4911	TUCSON ELECTRIC POWER CO	-0.03299	-43.56	1320.7
4911	UNITED ILLUMINATING CO	0.00771	6.45	836.8
4911	SOUTHERN CO	0.00953	100.70	10569.3
4911	DETROIT EDISON CO	0.01832	78.46	4282.1
4911	CENTERIOR ENERGY CORP	0.02028	60.71	2993.2
4911	PINNACLE WEST CAPITAL CORP	0.02680	77.65	2897.0
4911	OHIO EDISON CO	0.02928	92.51	3159.3
4911	CENTRAL MAINE POWER CO	0.03493	19.67	563.2
4911	NECO ENTERPRISES INC	0.03568	0.49	13.8
4911	KANSAS CITY POWER & LIGHT	0.03627	54.42	1500.2
4911	MIDDLE SOUTH UTILITIES	0.04523	235.82	5213.2
4911	UNION ELECTRIC CO	0.04931	169.79	3443.4
4911	EASTERN UTILITIES ASSOC	0.05323	19.77	371.4
4911	COMMONWEALTH EDISON	0.05360	519.16	9685.1
4911	AMERICAN ELECTRIC POWER	0.05616	421.32	7501.8
4911	PENNSYLVANIA POWER & LIGHT	0.06238	234.64	3761.6
4911	GULF STATES UTILITIES CO	0.06606	164.18	2485.2
4911	HOUSTON INDUSTRIES INC	0.06700	326.65	4875.4
4911	DUQUESNE LIGHT CO	0.07562	154.45	2042.5
4911	ATLANTIC CITY ELECTRIC	0.08179	72.85	890.7
4911	CENTRAL VERMONT PUB SERV	0.10296	27.00	262.3
4911	CAROLINA POWER & LIGHT	0.11250	446.37	3967.6
4911	TEXAS UTILITIES CO	0.11771	878.09	7460.1
4911	BOSTON EDISON CO	0.12087	175.99	1456.0
4911	MINNESOTA POWER & LIGHT	0.12133	103.89	856.3
4911	GENERAL PUBLIC UTILITIES	0.12559	372.04	2962.4

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
4911	FPL GROUP INC	0.128134	744.13	5807.4
4911	SOUTHWESTERN PUBLIC SERV CO	0.129019	165.02	1279.1
4911	UTAH POWER & LIGHT	0.132622	254.46	1918.7
4911	EL PASO ELECTRIC CO	0.133951	126.68	945.7
4911	CENTRAL & SOUTH WEST CORP	0.138433	669.94	4839.5
4911	TNP ENTERPRISES INC	0.140540	28.04	199.5
4911	IDAHO POWER CO	0.140781	155.86	1107.1
4911	DUKE POWER CO	0.155903	1025.02	6574.7
4911	SOUTHERN CALIF EDISON CO	0.159906	1445.60	9040.3
4911	OKLAHOMA GAS & ELECTRIC	0.160554	280.05	1744.3
4911	TECO ENERGY INC	0.163054	219.62	1346.9
4911	GREEN MOUNTAIN POWER CORP	0.164552	16.63	101.0
4911	NEVADA POWER CO	0.170270	94.29	553.7
4911	IPALCO ENTERPRISES INC	0.178143	226.25	1270.0
4911	KENTUCKY UTILITIES CO	0.178362	182.43	1022.8
4911	OTTER TAIL POWER CO	0.178785	68.52	383.3
4911	NEW ENGLAND ELECTRIC SYSTEM	0.184474	470.51	2550.5
4911	SAVANNAH ELEC & POWER	0.185549	46.28	249.4
4911	ALLEGHENY POWER SYSTEM	0.189185	577.54	3052.8
4911	CENTRAL LOUISIANA ELECTRIC	0.200762	147.92	736.8
4911	HAWAIIAN ELECTRIC INDS	0.218984	159.67	729.1
4911	POTOMAC ELECTRIC POWER	0.224416	586.83	2614.9
4911	IOWA RESOURCES INC	0.225039	169.13	751.6
4911	EMPIRE DISTRICT ELECTRIC CO	0.228709	50.42	220.5
4911	SOUTHWESTERN ELEC SERVICE	0.230682	9.49	41.1
4911	UPPER PENINSULA POWER	0.231220	14.89	64.4
4911	EDISON SAULT ELECTRIC	0.245096	5.33	21.8
4922	PANHANDLE EASTERN CORP	0.025983	38.88	1496.4
4922	TRANSCO ENERGY CO	0.121969	200.20	1641.4
4922	COASTAL CORP	0.123271	521.26	4228.6
4922	SONAT INC	0.377440	724.49	1919.5
4922	TENNECO INC	0.377594	5368.81	14218.5
4923	COLUMBIA GAS SYSTEM	0.032708	99.34	3037.1
4923	SOUTHWEST GAS CORP	0.134083	32.99	246.1
4923	ARKLA INC	0.141956	200.67	1413.6
4923	ENSERCH CORP	0.165049	299.49	1814.5
4923	EQUITABLE RESOURCES INC	0.179068	140.71	785.8
4923	ONEOK INC	0.190598	157.24	825.0
4923	SOUTHWESTERN ENERGY CO	0.207598	55.26	266.2
4923	LOUISIANA GENERAL SERVICES	0.209356	22.19	106.0
4923	CONSOLIDATED NATURAL GAS CO	0.209652	670.35	3197.4
4923	K N ENERGY INC	0.246960	121.78	493.1
4923	ENTEX INC	0.252932	143.28	566.5
4923	NORTH CAROLINA NATURAL GAS	0.320657	30.89	96.3
4923	ALATENN RES INC	0.472744	49.39	104.5
4924	SOUTHERN UNION CO	0.069646	20.54	294.9
4924	NATIONAL FUEL GAS CO	0.104384	62.77	601.4
4924	SOUTH JERSEY INDUSTRIES	0.107983	16.62	153.9
4924	MICHIGAN ENERGY RESOURCES CO	0.120647	8.43	69.9
4924	WASHINGTON ENERGY CO	0.121073	27.94	230.7
4924	NEW JERSEY RESOURCES CORP	0.146865	22.72	154.7
4924	BROOKLYN UNION GAS CO	0.194824	138.99	713.4
4924	VALLEY RESOURCES INC	0.241230	5.97	24.7
4924	PACIFIC LIGHTING CORP	0.243472	663.06	2723.4
4924	PUBLIC SERVICE CO OF N C	0.248233	37.64	151.6

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
4924	BAY STATE GAS	0.252441	51.40	203.6
4924	ATLANTA GAS LIGHT CO	0.255174	116.38	456.1
4924	CONNECTICUT NATURAL GAS CORP	0.264502	34.56	130.7
4924	NORTHWEST NATURAL GAS CO	0.271659	89.68	330.1
4924	PIEDMONT NATURAL GAS CO	0.281402	60.21	214.0
4924	PROVIDENCE ENERGY CORP	0.289903	23.61	81.4
4924	WASHINGTON GAS LIGHT CO	0.290728	151.22	520.1
4924	CASCADE NATURAL GAS CORP	0.306156	28.02	91.5
4924	PRIMARK CORP	0.316731	285.45	901.3
4924	INDIANA ENERGY INC	0.330532	102.25	309.3
4924	PEOPLES ENERGY CORP	0.338712	923.24	2725.7
4924	LACLEDE GAS CO	0.353757	150.10	424.3
4924	CITY GAS CO OF FLORIDA	0.362027	20.20	55.8
4931	LONG ISLAND LIGHTING	-0.097748	-371.68	3802.4
4931	NEW YORK STATE ELEC & GAS	-0.075946	-144.86	1907.4
4931	NIAGARA MOHAWK POWER	-0.026841	-100.44	3741.9
4931	ROCHESTER GAS & ELECTRIC	-0.021323	-21.67	1016.3
4931	WASHINGTON WATER POWER	0.018576	12.28	660.9
4931	PACIFICORP	0.023879	58.33	2442.9
4931	PHILADELPHIA ELECTRIC CO	0.042268	214.79	5081.6
4931	PUBLIC SERVICE ENTERPRISES	0.061665	371.35	6022.0
4931	NORTHEAST UTILITIES	0.065103	209.14	3212.4
4931	CMS ENERGY CORP	0.072788	210.96	2898.2
4931	SIERRA PACIFIC RESOURCES	0.077135	41.79	541.7
4931	I E INDUSTRIES INC	0.079376	37.03	466.5
4931	FITCHBURG GAS & ELEC LIGHT	0.096612	3.54	36.6
4931	ILLINOIS POWER CO	0.103879	283.42	2728.4
4931	MONTANA POWER CO	0.107782	106.00	983.5
4931	DOMINION RESOURCES INC-VA	0.109195	551.74	5052.9
4931	NORTHERN INDIANA PUBLIC SERV	0.111799	196.16	1754.6
4931	DPL INC	0.118724	160.76	1354.0
4931	NORTHWESTERN PUBLIC SERV CO	0.119484	21.06	176.2
4931	CINCINNATI GAS & ELECTRIC	0.124501	216.17	1736.3
4931	SCANA CORP	0.150839	265.74	1761.7
4931	CENTRAL HUDSON GAS & ELEC	0.157421	93.36	593.0
4931	DELMARVA POWER & LIGHT	0.166360	214.14	1287.2
4931	UTILICORP UNITED INC	0.167509	58.10	346.8
4931	MIDWEST ENERGY CO	0.167736	111.58	665.2
4931	PACIFIC GAS & ELECTRIC	0.170724	2010.54	11776.6
4931	PUBLIC SERVICE CO OF N MEX	0.171125	261.23	1526.5
4931	SAN DIEGO GAS & ELECTRIC	0.173213	370.57	2139.4
4931	BALTIMORE GAS & ELECTRIC	0.183875	601.98	3273.9
4931	COMMONWEALTH ENERGY SYSTEM	0.186490	113.37	607.9
4931	KANSAS POWER & LIGHT	0.193824	231.78	1195.8
4931	PUBLIC SERVICE CO OF COLO	0.199086	339.34	1704.5
4931	ST JOSEPH LIGHT & POWER	0.201259	28.52	141.7
4931	CILCORP INC	0.205186	172.74	841.9
4931	IOWA-ILLINOIS GAS & ELEC	0.212988	191.47	899.0
4931	CENTRAL ILL PUBLIC SERVICE	0.214371	284.84	1328.7
4931	CITIZENS UTILITIES CO-CL A	0.214556	132.10	615.7
4931	LOUISVILLE GAS & ELECTRIC	0.215337	239.13	1110.5
4931	SOUTHERN INDIANA GAS & ELEC	0.216740	105.35	486.0
4931	ORANGE & ROCKLAND UTILITIES	0.216934	133.64	616.0
4931	NORTHERN STATES POWER-MN	0.234931	803.09	3418.4
4931	CONSOLIDATED EDISON OF NY	0.261305	2207.43	8447.7

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
4931	IOWA SOUTHERN INC	0.27410	80.679	294.34
4931	WISCONSIN POWER & LIGHT	0.29804	307.267	1030.95
4931	MADISON GAS & ELECTRIC CO	0.30072	112.339	373.57
4931	WISCONSIN PUBLIC SERVICE	0.30660	307.873	1004.14
4931	INTERSTATE POWER CO	0.31120	140.355	451.02
4931	WISCONSIN ENERGY CORP	0.32721	861.984	2634.36
4932	MDU RESOURCES GROUP INC	0.14541	73.573	505.95
4932	UGI CORP	0.16617	49.443	297.55
4940	UNITED WATER RESOURCES INC	0.14080	22.872	162.45
4940	AMERICAN WATER WORKS INC	0.19167	105.930	552.68
4940	PHILADELPHIA SUBURBAN CORP	0.32494	133.007	409.32
4940	SJW CORP	0.36152	46.171	127.72
4950	WASTE MANAGEMENT INC	0.35278	730.001	2069.28
4950	BROWNING-FERRIS INDS	0.42315	527.511	1246.63
5012	SUBARU OF AMERICA	0.43025	302.239	702.47
5012	MYERS INDUSTRIES INC	0.44519	31.565	70.90
5012	MID-AMERICA INDS	0.49151	10.951	22.28
5012	STEEGO CORP	0.63265	29.407	46.48
5030	LEWIS (PALMER G.) CO INC	0.38418	10.722	27.91
5050	CASTLE (A.M.) & CO	0.36811	35.702	96.99
5050	COMMERCIAL METALS CO	0.37451	87.847	234.57
5050	JORGENSEN (EARLE M.) CO	0.44927	145.650	324.19
5050	DAVIS WATER & WASTE	0.45429	8.442	18.58
5063	CLARK CONSOLIDATED INDS	0.40077	5.103	12.73
5063	GRAINGER (W.W.) INC	0.42498	521.863	1227.97
5063	ANIXTER BROS INC	0.43122	111.172	257.81
5063	HUGHES SUPPLY INC	0.45869	54.034	117.80
5064	GRAY COMMUNICATION SYSTEM	0.46880	22.384	47.75
5065	TYLER CORP	0.37090	176.163	474.96
5065	ASTREX INC	0.39715	4.748	11.96
5065	PREMIER INDUSTRIAL CORP	0.41619	297.546	714.92
5065	PIONEER STANDARD ELECTRONICS	0.47186	20.393	43.22
5065	DIODES INC	1.26126	1.303	1.03
5070	WAXMAN INDUSTRIES	0.29868	5.315	17.79
5070	NOLAND CO	0.40665	44.080	108.40
5070	LAWSON PRODUCTS	0.45566	93.437	205.06
5080	AERO SYSTEMS INC	0.15914	1.828	11.49
5080	BANNER INDUSTRIES INC	0.31680	22.387	70.67
5080	AAR CORP	0.39406	41.700	105.82
5080	SPEED-O-PRINT BUS MACHINES	0.41755	2.446	5.86
5080	OWENS & MINOR INC	0.44812	26.582	59.32
5080	NASHUA CORP	0.48697	152.475	313.11
5099	HANDLEMAN CO	0.41195	115.853	281.23
5099	ACTION INDUSTRIES INC	0.52033	23.344	44.86
5120	BERGEN BRUNSWIG CORP-CL A	0.37495	97.258	259.39
5120	DURR-FILLAUER MEDICAL	0.43072	34.563	80.24
5130	INTL SEAWAY TRADING CORP	0.47329	3.800	8.03
5140	STALEY CONTINENTAL INC	0.12803	87.046	679.92
5140	KAY CORP	0.30881	36.247	117.37
5140	SUN CITY INDUSTRIES	0.37273	5.595	15.01
5140	WETTERAU INC	0.40144	161.263	401.71
5140	RYKOFF-SEXTON INC	0.44445	66.798	150.29
5140	INTL DAIRY QUEEN-CL A	0.45242	58.470	129.24
5140	SUPER VALU STORES INC	0.45697	625.224	1368.18
5140	SUPER FOOD SERVICES INC	0.48162	52.173	108.33

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
5161	UNIVAR CORP	0.342801	83.97	245.0
5170	CHARTER CO	0.966177	289.37	299.5
5199	UNIVERSAL LEAF TOBACCO	0.432454	230.57	533.2
5211	PAY'N PAK STORES	0.398051	57.93	145.5
5211	HECHINGER CO-CL A	0.400502	95.35	238.1
5211	SCOTTY'S INC	0.424174	93.32	220.0
5211	PAYLESS CASHWAYS INC	0.427786	203.93	476.7
5211	WOLOHAN LUMBER CO	0.444851	30.00	67.4
5211	LOWE'S COS	0.456941	362.86	794.1
5211	STANDARD BRANDS PAINT CO	0.461455	167.28	362.5
5311	DILLARD DEPT STORES-CL A	0.202810	106.06	523.0
5311	SEARS, ROEBUCK & CO	0.227722	3357.29	14742.9
5311	CARTER HAWLEY HALE STORES	0.244057	255.51	1046.9
5311	PENNEY (J.C.) CO	0.261515	1891.49	7232.8
5311	JACOBSON STORES	0.323291	24.93	77.1
5311	CARSON PIRIE SCOTT & CO	0.347510	109.28	314.5
5311	STRAWBRIDGE & CLOTHIER-CL A	0.392773	147.65	375.9
5311	FEDERATED DEPT STORES INC	0.400347	2331.32	5823.3
5311	MAY DEPARTMENT STORES CO	0.417941	2246.56	5375.3
5311	MERCANTILE STORES CO INC	0.429001	632.42	1474.2
5331	ZAYRE CORP	0.246741	214.85	870.7
5331	JAMESWAY CORP	0.355724	56.16	157.9
5331	NICHOLS (S.E.)	0.397443	26.70	67.2
5331	DAYTON-HUDSON CORP	0.404948	1790.53	4421.6
5331	AMES DEPT STORES INC	0.415936	228.45	549.2
5331	WAL-MART STORES	0.431764	1319.73	3056.6
5331	FAMILY DOLLAR STORES	0.451687	131.77	291.7
5331	DOLLAR GENERAL	0.453648	97.36	214.6
5331	HECK'S INC	0.487068	81.22	166.8
5331	PIC'N SAVE CORP	0.502583	250.22	497.9
5334	SERVICE MERCHANDISE CO	0.398869	159.08	398.8
5334	BEST PRODUCTS	0.469847	233.35	496.7
5411	MARSH SUPERMARKETS INC	0.188906	15.59	82.5
5411	FOODARAMA SUPERMARKETS	0.213541	5.68	26.6
5411	GREAT ATLANTIC & PAC TEA CO	0.272496	67.63	248.2
5411	CULLUM COS	0.290348	65.83	226.7
5411	KROGER CO	0.319526	826.42	2586.4
5411	RUDDICK CORP	0.342586	54.46	159.0
5411	SEAWAY FOOD TOWN INC	0.365144	27.10	74.2
5411	STOP & SHOP COS	0.377550	217.58	576.3
5411	SUPERMARKETS GENERAL CORP	0.383658	279.38	728.2
5411	BRUNOS INC	0.391241	98.18	250.9
5411	BIG V SUPERMARKETS-CL A	0.401587	40.48	100.8
5411	FOOD LION INC-CL A	0.420742	217.75	517.5
5411	WINN-DIXIE STORES INC	0.426948	888.38	2080.8
5411	GODFREY CO	0.442707	32.59	73.6
5411	HANNAFORD BROTHERS CO	0.458837	77.98	170.0
5411	ALBERTSON'S INC	0.462769	548.23	1184.7
5411	WEIS MARKETS INC	0.472606	431.33	912.7
5411	MOTT'S SUPER MARKETS INC	0.482222	17.73	36.8
5411	BORMAN'S INC	0.641620	21.90	34.1
5411	PUEBLO INTERNATIONAL INC	0.642449	46.83	72.9
5412	MUNFORD INC	0.192741	11.62	60.3
5412	NATIONAL CONVENIENCE STORES	0.215931	36.05	167.0
5412	SOUTHLAND CORP	0.286455	580.02	2024.8

SIC CODE	COMPANY NAME	ETR	(In Millions) CTL	ANI
5412	CIRCLE K CORP	0.37079	154.79	417.45
5412	SUNSHINE-JR STORES	0.41823	18.90	45.20
5500	PEP BOYS-MANNY MOE & JACK	0.43849	119.13	271.69
5500	GRAND AUTO INC	0.44099	27.48	62.32
5500	DART GROUP CORP-CL A	0.48007	156.25	325.46
5600	NORDSTROM INC	0.33965	207.05	609.60
5600	EVANS INC	0.42927	28.54	66.49
5600	U S SHOE CORP	0.43627	432.67	991.75
5600	WIENER ENTERPRISES INC	0.44386	13.65	30.75
5600	FREDERICKS OF HOLLYWOOD	0.45021	11.57	25.70
5600	MELVILLE CORP	0.48338	1225.96	2536.23
5621	LIMITED INC	0.25598	276.67	1080.86
5621	PAUL HARRIS STORES	0.39614	18.26	46.10
5621	CHARMING SHOPPES	0.41344	127.21	307.69
5621	KENWIN SHOPS INC	0.45809	6.97	15.21
5661	EDISON BROTHERS STORES	0.41842	372.42	890.04
5712	JETRONIC INDUSTRIES INC	0.39489	6.66	16.86
5712	MICHAELS (J.) INC	0.44391	7.46	16.81
5712	INTERMARK INC	0.95986	49.41	51.47
5712	R B INDUSTRIES INC	0.96725	15.59	16.12
5812	RESTAURANT ASSOC INDS INC	0.23482	6.51	27.71
5812	FRISCH'S RESTAURANTS INC	0.33618	23.41	69.64
5812	WINNERS CORP	0.33829	4.00	11.84
5812	MCDONALD'S CORP	0.36603	2176.48	5946.18
5812	MORRISON INC	0.36609	108.43	296.18
5812	TW SERVICES INC	0.36901	375.47	1017.50
5812	SHONEY'S INC	0.38708	154.99	400.40
5812	LUBY'S CAFETERIAS INC	0.39726	88.41	222.54
5812	JERRICO INC	0.39774	142.72	358.82
5812	COLLINS FOODS INTERNATIONAL	0.40956	100.75	245.99
5812	CHURCH'S FRIED CHICKEN INC	0.42322	273.68	646.66
5812	ASSOCIATED HOSTS INC	0.44355	22.80	51.40
5812	BOB EVANS FARMS	0.45685	131.80	287.23
5912	PERRY DRUG STORES	0.18874	13.74	72.78
5912	FAY'S DRUG CO	0.36009	27.80	77.20
5912	WALGREEN CO	0.36264	372.68	1027.68
5912	GENOVESE DRUG STORES-CL A	0.37659	17.98	47.76
5912	AMERICAN STORES CO-NEW	0.45765	820.69	1793.27
5912	LONGS DRUG STORES INC	0.48817	352.69	722.47
5944	GORDON JEWELRY CORP	0.39870	181.30	454.74
5949	FABRI-CENTERS OF AMERICA	0.45281	43.30	95.62
5961	G R I CORP	0.41730	6.10	14.62
5961	NEW PROCESS CO	0.46776	152.96	327.01
5961	HORN & HARDART CO	1.08699	10.27	9.45
5962	ALLEGHENY BEVERAGE	0.39881	58.12	145.74
5999	GENERAL HOST CORP	0.17482	47.35	270.84
5999	D O C OPTICS CORP	0.37482	7.95	21.21
5999	OSHMAN'S SPORTING GOODS	0.41387	58.39	141.08
5999	GREENMAN BROTHERS INC	0.43958	19.88	45.22
5999	FLANIGAN'S ENTERPRISES INC	1.11301	1.34	1.20

VITA

Mark Higgins was born in Jersey City, New Jersey on October 23, 1957 to Matthew and Joan Higgins. After briefly living in Jersey City, he moved to Cranford, New Jersey where he resided until July of 1961 when he moved to East Brunswick, New Jersey. A 1971 graduate of Saint Bartholomew's Grammar School in East Brunswick, he attended Saint Joseph's High School in Metuchen and graduated in 1975. In the fall of that year, he enrolled at the University of South Carolina where he earned a B.S. in Accounting in 1979 and a Masters in Accounting in 1981.

He then went to work in the tax department of Arthur Young and Company's New York City office. In 1984, he received his CPA certificate and in July of 1985 he was promoted to Tax Manager. Also in July of that year, he married Ann Schnappauf. In the fall of 1985, he entered the accounting doctoral program at the University of Tennessee. He received his doctorate in May of 1989.

Mark and Ann are the proud parents of William Matthew who was born on September 11, 1989. In addition, Mark has a sister, Nancy, and a brother, Neil. He is currently employed as an Assistant Professor at the University of Rhode Island.