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Effective corporate income tax rates and their relationship to corporate attributes: A multidefinitional, multiperiod view

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EFFECTIVE CORPORATE INCOME TAX RATES AND THEIR RELATIONSHIP TO CORPORATE ATTRIBUTES: A MULTIDEFINITIONAL, MULTIPERIOD VIEW

A Dissertation

by

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ABSTRACT

Effective Corporate Income Tax Rates and Their Relationship to Corporate Attributes: A Multidefinitional, Multiperiod View. (December 1991)

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This study addresses the robustness of the relationship between effective corporate income tax rate (defined six different ways) and capital intensity, foreign involvement, export involvement, natural resource involvement, size, leverage, and level of income. These relationships were examined by multiple regression analysis. All variables except foreign involvement and level of income were hypothesized to have a negative relationship with the effective corporate income tax rate. These hypotheses were belied by the signs of the regression parameters. In terms of significance of the results, foreign involvement, capital intensity, size, and level of income were better than natural resource involvement, leverage, and export involvement.

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CHAPTER I

INTRODUCTION

Congress and the popular press frequently lament the low tax burdens of corporations. Since Congress has the power to increase taxes and the popular press can influence Congress, then measuring the tax rates of corporations and relating these rates to size (larger companies are accused of consuming more than their share of tax preferences) and other attributes are important components of addressing this concern.

The accounting literature includes only a few studies which examine how the corporate tax system relates to one or more corporate attributes. A key measure in these studies is the effective tax rate, which is generally defined as some measure of corporate taxes divided by some measure of corporate income. For example, Stickney and McGee (1982) examined the relationship of a corporate average effective tax rate (ETR) with size, capital intensity, natural resource involvement, foreign involvement, and leverage, while Zimmerman (1983) examined the relationship of the ETR with size. Bernard (1984) expressed some analytic concerns about the Stickney and McGee study. The present study utilizes several ETR definitions from the literature (and modifications thereof) to address Bernard's concerns.

Documentation follows Accounting Review.

Further detail on Bernard's concerns and how this study addresses them is provided in the prior literature chapter.

Within the narrow context of relating corporate attributes to ETRs for a specific sample, this study additionally addresses the following concerns: Would hypothesis testing yield consistent results over multiple tax rate definitions? Stated differently, are hypotheses about ETRs generalizable over varying definitions? Generalizability of research results over dimensions of that research are a crucial component of its credibility and importance.

In addition to addressing Bernard's concerns, other contributions of this study include the examination of hypotheses posited in prior accounting literature, refinement of those hypotheses, and formulation of new hypotheses concerning the relationship of ETRs to corporate attributes. These inquiries will utilize multiple tax rate definitions and accounting periods to ascertain the robustness of these hypotheses across definitions and time periods. Since the literature utilizing ETRs is plagued by a lack of consensus on the definition of ETR, a number of alternate rate definitions are available.

Prior studies hypothesized the following relationships: (1) a negative association between ETR and natural resource involvement, foreign involvement, capital intensity, leverage and size; and, in conflict, (2) a positive association between ETR and size. Further, a positive association between ETR and level of income has been analytically demonstrated. A new hypothesis to

be tested in this study concerns the relationship between ETR and export involvement.

A reexamination of the Stickney and McGee (1982) hypotheses and other hypotheses provides a test of the Zimmerman (1983) hypothesis regarding ETR and size with the advantage of including moderating variables from other studies. Inclusion of moderating variables should allay ceteris paribus concerns which might arise concerning a straight size and ETR hypothesis test. Given the conflict between Zimmerman (1983)[posited a positive relationship] and Stickney and McGee (1982) [posited an negative relationship] on the relationship between worldwide ETR and size, a multi-definitional approach should help resolve this empirical conflict. Porcano(1986) found an negative relationship between firm size and U.S. effective tax rate. In a replication of Zimmerman (1983) and Porcano (1986), Wilkie (1990), found results consistent with those of the original studies in each of the two replications using a large COMPUSTAT-based sample. The original studies and the replications were in conflict on the size hypothesis (e.g., Zimmerman - positive relationship, Porcano - negative relationship). One might question how differing results could be reached using the same database. It appears that different ETR definitions play a role, since Zimmerman employed a worldwide tax rate and Porcano used a domestic tax rate.

Prior to the reexamination of the hypotheses of prior studies and the examination of new hypotheses using multiple tax rate

definitions, a descriptive analysis of tax rates computed according to the varying definitions will be performed using correlation analysis and other techniques. This analysis is necessary to determine the extent to which the computed tax rates actually vary. Univariate statistics for the independent variables are in Table 1, while univariate statistics for the tax rates are in Table 2. Correlations among the independent variables are in Table 3 and correlations among the tax rate definitions are in Table 4.

In summary, this study will make multiple contributions to the accounting literature on ETRs. First, multivariate examination of the neutrality of the corporate income tax will be conducted in a multiperiod, multidefinitional setting in order the evaluate the robustness of prior findings in the accounting literature. In light of the lack of consensus regarding how an ETR should be defined, a multidefinitional approach will be helpful in evaluating the generalizability of the findings of the original studies. Omer, Molloy, and Ziebart (1991) suggest that researchers should evaluate the robustness of their results across alternative ETR measures. New hypotheses and refinements of prior hypotheses will also be examined for generalizability. Second, the use of multiple definitions which have varying components will help to overcome some of the criticisms which Bernard (1984) levied against Stickney and McGee's (1982) definition. Further, Zimmerman's (1983) controversial size hypothesis will be reexamined in this multivariate context. The multiperiod view of tax rates will allow speculation about macroeconomic factors and

TABLE 1
UNIVARIATE STATISTICS FOR INDEPENDENT VARIABLES FOR 1980 - 1983

VARIABLE NAME	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM	NUMBER OF INCLUSIONS
1980					
NSPROP	.0411	.1475	0	0.8961	527
FSPROP	0.1611	0.1916	0	0.9834	525
CPINTA	0.627	0.2739	0.0035	1.433	487
ASTLN	7.056	1.448	2.812	11.739	514
DBTSE	0.5171	0.7151	0	12.627	513
INCLVL	10.618	2.668	0	15.62	527
DISC	0.2561	0.4369	0	1	527
1981					
NSPROP	0.041	0.1455	0	0.8612	527
FSPROP	.1535	0.1817	0	0.9784	527
CPINTA	0.6368	0.275	0.0034	1.499	490
ASTLN	7.152	1.472	0.606	11.833	517
DBTSE	0.5057	0.7916	0	13.469	516
INCLVL	10.733	2.535	0	5.745	527
DISC	0.2561	0.4369	0	1	527
1982					
NSPROP	0.0397	0.142	0	0.9526	527
FSPROP	0.1472	0.1739	0	0.9784	527
CPINTA	0.657	0.2829	0.0028	1.492	491
ASTLN	7.229	1.485	1.235	11.906	518
DBTSE	0.5205	0.7978	0	13.769	517
INCLVL	10.248	10.248	0	15.76	527
DISC	0.256	0.4369	0	1	527
1983					
NSPROP	0.0398	0.1402	0	0.9598	526
FSPROP	0.1392	0.1668	0	0.9732	526
CPINTA	0.6559	0.2842	0.0028	1.442	492
ASTLN	7.317	1.481	1.009	11.915	519
DBTSE	0.4379	0.5558	-3.341	7.917	519
INCLVL	10.455	3.041	0	15.564	527
DISC	0.2561	0.4369	0	1	527

KEY: NSPROP=NATURAL RESOURCE SALES/TOTAL SALES
FSPROP=FOREIGN SALES/TOTAL SALES
DBTSE=DEBT/STOCKHOLDERS' EQUITY
ASTLN=LOG(TOTAL ASSETS)
CPINTA=GROSS PLANT/TOTAL ASSETS
INCLVL=LOG(OPERATING INCOME)
DISC=DUMMY FOR DOMESTIC INTERNATIONAL SALES CORPORATION

TABLE 2
UNIVARIATE STATISTICS FOR SIX TAX RATES
FOR YEARS 1980 THROUGH 1983

VARIABLE NAME	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM	NUMBER OF INCLUSIONS
1980					
ZIMMER	0.1631	0.7861	-14.873	1.352	474
ZIMMRA	0.0397	0.1571	-0.8636	0.4788	474
TXNT	0.2889	0.1987	-1.1794	1.397	527
STICKN	0.2938	0.3913	-5.241	2.276	436
VANIK	0.3105	0.3491	-0.3642	6.066	420
DORPEA	0.3042	0.341	-0.3642	6.066	420
1981					
ZIMMER	0.3372	0.3298	-2.235	2.3715	475
ZIMMRA	0.1011	0.1042	-0.5508	0.6984	475
TXNT	0.2607	0.2773	-3.3153	1.303	527
STICKN	0.3329	0.6657	-3.521	10.632	425
VANIK	0.2229	0.4529	-5.02	2.538	418
DORPEA	0.2191	0.4538	-5.021	2.538	418
1982					
ZIMMER	0.3357	0.7576	-1.101	14.834	478
ZIMMRA	0.0148	1.297	-28.158	0.5719	478
TXNT	0.1902	0.3388	-2.224	1.3	527
STICKN	-0.2195	12.184	-249.256	7.309	422
VANIK	0.2455	0.5828	-3.927	6.442	413
DORPEA	0.2283	0.5462	-3.927	6.442	413
1983					
ZIMMER	0.2897	0.3656	-2.289	3.053	477
ZIMMRA	0.0788	0.1612	-1.662	1.678	479
TXNT	0.2183	0.3001	-2.629	1.1912	527
STICKN	0.3131	0.945	-7.744	14.053	415
VANIK	0.1608	1.239	-22.696	2.336	404
DORPEA	0.1533	1.232	-22.7	2.064	404

KEY: TXNT= TAX NOTES DEFINITION
VANIK= CONGRESSMAN VANIK DEFINITION
DORPEA= CONGRESSMEN DORGAN AND PEASE DEFINITION
STICKN=STICKNEY AND MCGEE DEFINITION
ZIMMER=ZIMMERMAN(IDEAL DEFINITION)
ZIMMRA=ZIMMERMAN(ACTUAL DEFINITION)

TABLE 3
CORRELATIONS BETWEEN INDEPENDENT VARIABLES
USED IN REGRESSIONS FOR YEARS 1980 THROUGH 1983

1980	NSPROP	FSPROP	CPINTA	ASTLN	DBTSE	INCLVL	DISC
NSPROP	1.000						
FSPROP	.052	1.000					
CPINTA	.289	.094	1.000				
ASTLN	.140	.159	.292	1.000			
DBTSE	-.013	-.064	.057	.039	1.000		
INCLVL	.104	.081	.135	.561	-.109	1.000	
DISC	-.041	.076	-.158	-.132	-.103	.003	1.000

1981	NSPROP	FSPROP	CPINTA	ASTLN	DBTSE	INCLVL	DISC
NSPROP	1.000						
FSPROP	-.083	1.000					
CPINTA	.311	-.160	1.000				
ASTLN	.148	.333	.263	1.000			
DBTSE	.002	-.177	.001	.070	1.000		
INCLVL	.079	.166	.238	.542	-.291	1.000	
DISC	-.040	.027	-.144	-.126	.113	.022	1.000

1982	NSPROP	FSPROP	CPINTA	ASTLN	DBTSE	INCLVL	DISC
NSPROP	1.000						
FSPROP	-.080	1.000					
CPINTA	.320	-.125	1.000				
ASTLN	.136	.296	.245	1.000			
DBTSE	.017	-.156	.014	.071	1.000		
INCLVL	-.141	.106	.018	.421	-.143	1.000	
DISC	-.040	.059	-.100	-.137	-.124	-.049	1.000

1983	NSPROP	FSPROP	CPINTA	ASTLN	DBTSE	INCLVL	DISC
NSPROP	1.000						
FSPROP	-.086	1.000					
CPINTA	.350	-.144	1.000				
ASTLN	.126	.254	.242	1.000			
DBTSE	.055	-.197	.147	.173	1.000		
INCLVL	-.061	.095	-.004	.408	-.055	1.000	
DISC	-.036	.112	-.109	-.138	-.129	-.088	1.000

KEY:
NSPROP=NATURAL RESOURCE SALES/TOTAL SALES
FSPROP=FOREIGN SALES/TOTAL SALES
DBTSE=DEBT/STOCKHOLDERS' EQUITY
ASTLN=LOG(TOTAL ASSETS)
CPINTA=GROSS PLANT/TOTAL ASSETS
INCLVL=LOG(OPERATING INCOME)
DISC=DUMMY FOR DOMESTIC INTERNATIONAL SALES CORPORATION

TABLE 4
CORRELATIONS BETWEEN SIX TAX RATES FOR YEARS 1980 THROUGH 1983

1980	ZIMMER	ZIMMRA	TXNT	STICKN	VANIK	DORPEA
ZIMMER	1.000					
ZIMMRA	.441	1.000				
TXNT	.334	.425	1.000			
STICKN	.273	.298	.403	1.000		
VANIK	.146	.212	.179	.459	1.000	
DORPEA	.150	.216	.152	.452	.993	1.000

1981	ZIMMER	ZIMMRA	TXNT	STICKN	VANIK	DORPEA
ZIMMER	1.000					
ZIMMRA	.573	1.000				
TXNT	.454	.401	1.000			
STICKN	.047	.038	.042	1.000		
VANIK	.376	.280	.469	-.098	1.000	
DORPEA	.381	.280	.479	-.097	.999	1.000

1982	ZIMMER	ZIMMRA	TXNT	STICKN	VANIK	DORPEA
ZIMMER	1.000					
ZIMMRA	.082	1.000				
TXNT	.168	.045	1.000			
STICKN	.024	.030	.040	1.000		
VANIK	.097	.206	.129	.074	1.000	
DORPEA	.114	.246	.224	.084	.944	1.000

1983	ZIMMER	ZIMMRA	TXNT	STICKN	VANIK	DORPEA
ZIMMER	1.000					
ZIMMRA	.471	1.000				
TXNT	.349	.274	1.000			
STICKN	-.023	.022	.078	1.000		
VANIK	.203	.155	.269	-.014	1.000	
DORPEA	.196	.147	.259	-.021	.996	1.000

KEY:
TXNT= TAX NOTES DEFINITION
VANIK= CONGRESSMAN VANIK DEFINITION
DORPEA= CONGRESSMEN DORGAN AND PEASE DEFINITION
STICKN=STICKNEY AND MCGEE DEFINITION
ZIMMER=ZIMMERMAN(IDEAL DEFINITION)
ZIMMRA=ZIMMERMAN(ACTUAL DEFINITION)

intertemporal differences in the relationship between tax rates and the independent variables to be employed herein. Third, borrowing from the results of Wilkie (1988), a level of income variable will be added to the analysis. This addition will allow an extension of earlier analyses which incorporate more recent research on ETRs.

Relevance to Tax Policy

With respect to tax policy, an important question is whether the government should give preferential tax treatment to certain kinds of companies and activities in order to encourage certain activities or whether the corporate tax policy should be devoid of such preferential treatment. Those firms receiving preferential tax treatment and their advocates argue that the risks involved with large capital requirements, lengthy production periods, natural resource exploitation, and other factors justify special treatment.

For example, proponents of special treatment for oil, gas, and minerals cite several rationales for their position: (1) the unusual risks of exploration and production; (2) generous tax allowances are necessary to finance additional discoveries of natural resources; and (3) a secure national defense requires constant exploration and production (Pechman, 1988). The underpinning of the latter argument is that national defense and the health of

industries related to it are public goods which will be underproduced in a free market setting.

Opponents of preferential treatment argue that the "market" can evaluate the risks of large capital requirements, lengthy production periods, natural resource exploitation, and other factors and allocate capital more efficiently than government (which is subject to political influence). They also argue that corporate size should not influence the rate of taxation, and that both domestic and foreign operations should be taxed similarly.

The main innovation of Stickney and McGee (1982), compared to some other studies reviewed in this paper, is their examination of the corporate income tax system in a multivariate setting using variables based on general corporate attributes. Instead of concentrating on the effect of specific tax preferences (e.g., investment tax credit, accelerated depreciation, etc.) on the ETR, Stickney and McGee focus on more general corporate attributes (e.g., capital intensity, foreign involvement) likely to be related to specific tax provisions.

The relationship of these corporate attributes to the ETR is of importance to tax policy makers because these attributes are proxies for the risks which underpin the rationales for the specific tax provisions. In other words, tax preferences are awarded to firms taking the risks involved with large capital requirements, lengthy production periods, natural resource exploitation, foreign involvement, export involvement and debt vs. equity financing. The extent to which firms are taking the

TABLE 5

DEFINITION OF VARIABLES USED IN STICKNEY AND MCGEE (1982)

VARIABLE	MEASURE
EFFECTIVE TAX RATE	1. FEDERAL, FOREIGN, STATE, LOCAL TAXES PAYABLE / PRETAX BOOK INCOME - DEFERRED TAX EXPENSE/0.46
CAPITAL INTENSITY	2. GROSS PLANT ASSETS/TOTAL ASSETS (CAPINTA)
	3. NET PLANT ASSETS/TOTAL ASSETS (CAPINTB)
	4. LN(DEPRECIATION EXP)/(NUMBER OF EMPLOYEES) (CAPINTC)
	5. LN(GROSS PLANT ASSETS)/(NUMBER OF EMPLOYEES) (CAPINTD)
EXTENT OF FOREIGN INVOLVEMENT	6. FOREIGN SALES/TOTAL SALES (FSPROP)
NATURAL RESOURCE INVOLVEMENT	7. NATURAL RESOURCE SALES/TOTAL SALES (NSPROP)
SIZE	8. LN(TOTAL SALES) (SLSLN)
	9. LN(TOTAL ASSETS) (ASTLN)
PROPORTION OF DEBT	10. LONG TERM DEBT/STOCKHOLDER'S EQUITY (DBTSE)
IN CAPITAL STRUCTURE	11. LONG TERM DEBT/TOTAL EQUITIES (DBTTE)

risks embodied in the attributes noted above can be diagnosed by financial ratios such as those noted in Table 5. An examination of the relationship between ETR and corporate attributes will allow tax policy makers to assess the extent to which risk-taking firms were rewarded with lower tax rates (see negative relationships hypothesized in the prior literature chapter) during the period under consideration.

The remaining chapters of this dissertation consist of the following: prior literature, selection of alternate effective corporate income tax rate definitions, hypothesized relationships, data, methodology, and future extensions.

CHAPTER II

PRIOR LITERATURE

Introduction

An average effective corporate income tax rate (ETR) is basically the income tax paid by a corporation divided by its pretax income. Average effective corporate income tax rates (ETRs) have been employed mainly in three types of studies: (1) studies of the inter-industry equity of the corporate income tax, (2) analyses of the efficiency of the corporate income tax as it exists at a particular time, and (3) studies of what corporate attributes relate to the level of the ETR. The inter-industry equity of the corporate income tax has mainly been a concern of Congress as evidenced by Vanik (1972 - 1980) and Pease and Dorgan (1981 - 1984). Analyses of the efficiency of the corporate income tax using ETRs generally involve the computation of the welfare loss resulting from the lack of horizontal equity among industries.

Computations of average effective corporate tax rates and average effective total tax rates on corporate capital rely on three main sources of data: (1) the financial statements (annual reports and/or 10K's) of publicly held corporations, (2) the Treasury's Statistics of Income series, which provides tax return information at various levels of aggregation, and (3) the Commerce Department's National Income and Product Accounts (NIPA), which aggregate tax return information in a manner consistent with macroeconomic national income analysis.

The first research design issue in performing an analysis of effective corporate income tax rates is to select a database(s) from which to draw observations. Among the publicly available sources as mentioned by Weiss (1979) (Treasury's Statistics of Income series, Commerce's National income and Product Account compilations, and published financial statements), published financial statements offer by far the greatest subdivision of the data. Use of financial statement data allows a more rigorous application of statistical techniques than that possible with the other two major sources of data. While unaggregated tax return data might represent a superior source, they are not publicly available. The use of aggregate tax return data to compute tax rates is discussed in Spooner (1986) and is subject to a number of limitations. Since the NIPA compilations are based on the same data as the Treasury's Statistics of Income series and are presented in a more aggregated form, the use of NIPA data for purposes of this research would appear to be repetitive. Given the advantages of using financial statement data and the disadvantages of using aggregate Treasury data, coupled with the use of financial statement data in accounting literature inquiries into ETRs, financial statement based data will be the overall database choice.

Tax Rates Computed from Financial Statement Data

Tax Terminology

A company's total income tax expense (for financial accounting purposes) is comprised of two parts - current income tax expense and deferred income tax expense. Current income tax expense generally equates to taxes payable in the current period, while deferred income tax expense generally equates to taxes payable (theoretically) in future periods which are expensed in the current period. Deferred income tax expense arises from differences between tax rules and financial accounting rules. Each of these two elements of total income tax expense may contain federal (U.S.), foreign, and state and local income taxes.

Alternative ETR Definitions in Prior Literature

Congressional Studies

Congressional interest in the relative tax burdens of corporate taxpayers started the trend of computing effective corporate income tax rates from financial statement data. Congressman Vanik (1972, 1973, 1974, 1975, 1976, 1978, 1979, 1980) made studies of the effective income tax rates of selected large U.S. corporations for the years 1971 through 1978. Representatives Dorgan and Pease (1981, 1982, 1983, 1984) picked up the gauntlet laid down by Vanik and computed similar rates for the years 1980 through 1983.

Where possible, Vanik or Dorgan and Pease calculated U.S., foreign, and worldwide tax rates based on the ratio of the U.S., foreign, or total current tax expense to the U.S., foreign, and worldwide income before tax (with minor adjustments to income). Where there was no allocation of income between U.S. and foreign sources, then Vanik computed the worldwide tax over worldwide income rate and the U.S. tax over worldwide income rate. Vanik defined worldwide income before tax as income before federal and foreign taxes adjusted to eliminate the equity in the earnings/losses of unconsolidated subsidiaries and to restore the minority interest in the earnings of consolidated subsidiaries.

The rationale for the first adjustment is as follows: since the equity in the earnings of unconsolidated subsidiaries is accounted for on a net of tax basis, the inclusion of this equity in income would deflate the tax rate by increasing the denominator of the tax rate fraction by less than the appropriate amount of income and by not increasing the numerator by the related tax, thereby biasing the calculation.

The logic for the second adjustment is the converse of that for the first adjustment: By excluding the minority interest in the income of a consolidated subsidiary from the denominator of the tax rate fraction, while the entire tax related to the subsidiary's income remains in the numerator, an overstatement of the tax rate will occur. Pease and Dorgan make no mention of this second adjustment. However, they make an adjustment to

eliminate the net earnings of wholly owned finance subsidiaries which are generally accounted for using the equity method. This adjustment is another method of dealing with the type of bias dealt with by Vanik's first adjustment to income. Further, where it is clear that a finance subsidiary is generating significant tax benefits, then a parent-subsidiary combined tax rate is computed (by Pease and Dorgan) by aggregating the current income tax expense and pretax income for both.

Vanik, and later, Pease and Dorgan justify using current tax expense as a measure of tax paid by stating that deferred taxes often roll over from one year to the next, and are paid, if ever, in the distant future.

Tax Notes Study (1982) and Marovelli (1986)

Since its inception in the early seventies, Tax Notes, a weekly publication of Tax Analysts, Inc., has offered sporadic computations of tax rates, usually one industry at a time. In 1982, Tax Notes offered a compilation of 1981 and 1980 effective corporate income tax rates computed on a worldwide, foreign, and domestic basis for approximately 200 companies. At least part of the impetus behind these computations was a 1980 Accounting Series Release issued by the SEC that generally mandated an allocation of pretax income between domestic and foreign sources.

Tax Analysts, Inc. computed the denominator of the worldwide tax rate fraction, the worldwide base figure, by

making the following adjustments to operating net income: (1) subtract equity in the earnings of unconsolidated subsidiaries; (2) add other taxable income items (e.g., capital gains) and (3) subtract state and local income taxes. The rationale for the first adjustment has already been discussed. The second adjustment was justifiable on the grounds that it brings the denominator closer to "economic income," a measure of income generally considered desirable in effective rate computations. State and local income taxes were subtracted because they represent just another deductible expense of doing business. Where the main emphasis of the tax policy analysis is at the federal level, then this adjustment acts to clarify the inquiry.

Worldwide tax expense was defined by Tax Analysts, Inc. as an income tax represented by the worldwide base figure (described in the previous paragraph) times the statutory tax rate (46%), reduced by permanent, quasi-permanent, and DISC differences (whose tax reductions are expressed as percentages of the worldwide base figure).

Permanent differences between financial and tax accounting present no controversy and consist of such items as investment tax credit, tax-exempt income, reduced tax rate on capital gains, excess depletion, unrepatriated foreign earnings, foreign income tax rates in excess of 46%, and nondeductible losses.

A subtraction of tax reduction percentages for quasi-permanent differences (e.g., accelerated depreciation, intangible drilling costs, mine development costs), on the other hand,

represents a partial reduction in the deferred income tax expense represented in a financial statement, a treatment which has evoked heated comment from at least one major corporation. Tax Analysts, Inc. justified this treatment by pointing to the steady growth in the deferred tax provision account for major corporations as an indication that these deferred credits represent 'contingent' liabilities which can be deferred indefinitely. This argument was basically the same as that advanced by Congressmen Vanik, Dorgan, and Pease in support of their tax rate numerators. However, Tax Analysts, Inc. did allow the inclusion (in the numerator of the tax rate fraction) of deferred income tax expense components which will 'turn around' in the short term, (such as warranty costs). The DISC adjustment is separately stated due to the lack of consistent treatment in financial statements (some firms called it a permanent difference while other firms called it a timing difference). The information for these computations was derived from a tax footnote(s) to the financial statements of the company being examined.

In addition to the compilation of a worldwide tax rate, all of the adjustments described above are expressed in terms of percentages of the worldwide base figure to facilitate comparison. Also, where possible, U.S. and foreign tax rates are computed. The computation is similar to that described for computing the worldwide tax rate. Unless a corporation has disclosed otherwise, quasi-permanent adjustments are allocated totally to the

reduction of the U.S. rate on U.S. income. To the extent that a portion of these adjustments are allocable to foreign income tax, then the U.S. rate will tend to be understated, while the foreign rate will be overstated. Lack of data is the rationale given in support of this allocation of quasi-permanent items.

The 1980 and 1981 Tax Notes rates described above were utilized by Dworin and Lynch (1984) in an examination of the relationship between firm size and tax rates.

More recent data is available in a volume from Tax Analysts, Inc. which offers a compilation of Tax Notes rates for the years 1980-1984 for 527 companies. [Marovelli (1986)]. Marovelli (1986) served as a data source for Wilkie (1988) and will be one of several data sources for this research.

If the desire of a researcher is to utilize an effective tax rate which incorporates partial inter-period tax allocation, then the rates compiled in Marovelli (1986) would represent a readily available approximation, given the "quasi-permanent" approach to most inter-period differences nominally styled as temporary "timing" differences. This partial allocation approach goes part of the way towards implementing the suggestion of Chaney and Jeter (1989) that deferred income taxes be accounted for by the use of partial allocation with discounting.

Stickney and McGee Study(1982)

Stickney and McGee(1982), in an examination of the effect of various factors (see hypothesized relationships below) on the

effective corporate income tax rate, defined a COMPUSTAT based tax rate as a ratio of two quantities: These quantities are (1) Current income tax expense (current federal(U.S.), foreign, state, and local income taxes combined), and (2) pretax book income minus the quantity deferred tax expense divided by the statutory tax rate (46%). While not explicitly expressed, the underlying rationale for defining the numerator of the tax rate fraction as current income tax expense instead of total income tax expense is likely to have been similar to those previously discussed. The authors posit that book income is preferable to taxable income (as a component of the denominator) because of the inclusion in book income of items which receive preferential tax treatment (interest on municipal bonds, etc.) Clearly, book income more nearly approximates "economic income" than does taxable income and is therefore a better choice. Also, due to strict statutes regarding the confidentiality of tax "return information," taxable income is not available on a disaggregated basis.

The second component of the denominator was included in an attempt to 'filter out' the effect of using divergent accounting procedures to compute pretax income. The use of different accounting methods across companies was purported to inhibit the comparability of the pretax book incomes of the firms studied. This adjustment has an unintended effect which was discussed in Bernard (1984) and was further detailed above.

The hypothesized relationship of effective tax rate with independent variables were as follows:

Independent Variable	Relates to ETR
Degree of capital intensity	-
Extent of foreign operations (based on prelim results)	-
Extent of natural resources involvement	-
Size of firm	-
Proportion of debt in capital structure (leverage)	-

The Stickney and McGee(1982) study employed a cluster analysis to test the hypotheses described above. This cluster analysis was based on a K-means clustering algorithm (Anderberg, 1973). All cluster analyses in this study were performed on the ten explanatory variables (see Table 5) after they were standardized. The effective tax rate was not used in the clustering. Instead, the hypotheses listed above were tested by observing the level of effective tax rates for the clusters derived from the performance of the statistical analysis. Due to the highly similar results for the 1978 and 1980 years, only 1980 results were reported.

The data utilized was derived from 1978 and 1980 COMPUSTAT tapes. The intersection of these two years produced an initial population of 1236 companies. By filtering out corporations with effective rates greater than 100% or less than

0%, the population was reduced to 1097 firms. Examinations of the distributional characteristics of the explanatory variables yielded 46 firms which had extreme outlier observations (on one or more variables) that were insensitive to variable transformation. These 46 companies were deleted from the population, leaving 1051. From this 1051, a random sample of 263 was drawn. Further elimination of 7 firms whose data could not support a measurement of extent of foreign operations yielded a working sample of 256 firms.

The hypothesized relationships held for three out of five factors examined. That is, hypothesis testing showed that the effective tax rate was negatively related to capital intensity, leverage, and natural resource involvement. No relationship was found between effective tax rate and either foreign involvement or size.

Bernard(1984)

Bernard (1984) analytically demonstrated that the ETR defined by Stickney and McGee (1982) should not be affected by either tax deductions that are also included in the computation of pretax book income (interest) or tax deductions (e.g., accelerated depreciation) that represent timing differences. Based on these analytics, Bernard concluded that the Stickney and McGee (1982) ETR should not be affected by variations in leverage and capital intensity.

Two examples of Bernard's concerns are as follows:

Bernard (1984) posited that the rate defined by Stickney and McGee (1982) could not be affected by either tax deductions which are also accounted for in pretax book income or deductions which represent timing differences. He illustrated his point by the use of two examples which are highly similar to the two offered below:

Example 1 - timing differences

Suppose that two firms, X and Y use the same financial accounting methods and report the same pretax book income, 1000 dollars. In order to minimize taxes, Y uses a depreciation method which results in a tax depreciation expense which exceeds book depreciation by 50 dollars. Given that the statutory income tax rate is 46%, the current taxes payable by the two firms will be as illustrated below:

	FIRM X	FIRM Y
Pretax book income	1,000	1,000
Timing difference	0	(50)
Taxable income	1,000	950
times tax rate	x.46	x.46
Current taxes payable	460	437

Next view the manner in which the two firms represent income tax expense for financial accounting purposes:

	FIRM X	FIRM Y
Currently payable taxes	460	437
Deferred taxes (46% X timing difference)	0	23
Total tax expense	460	460

Now compute the denominators of the two tax rate fractions:

Firm X tax rate denominator = 1,000 - 0 = 1,000
Firm Y tax rate denominator = 1,000 - 23/.46 = 950
(23 = 50 x .46)

The final step is to compute the tax rate for each firm:

Firm X tax rate = 460/1,000 = 46%
Firm Y tax rate = 437/950 = 46%

Note that both these firms have the same effective tax rate, even though Y used a faster depreciation method than X. This illustrates the problem with the adjustment which Stickney and McGee (1982) made to pretax book income in the denominator of their tax rate fraction. It appears that this problem can be corrected by omitting the component of the denominator in which timing differences are divided by the statutory tax rate.

Example 2 - expenses that reduce tax and book income

Suppose that two firms, X and Y use the same financial accounting methods and report the same earnings before interest and taxes, 1000 dollars. Further suppose that X distributes a portion of its earnings as dividends, which are nondeductible, while Y distributes a portion of its earnings as tax deductible interest. The taxable income and the current taxes payable of the two firms are as follows:

	FIRM X	FIRM Y
Earnings before interest and taxes	1,000	1,000
Interest	0	(50)
Taxable/book income	1,000	950
times tax rate	x.46	x.46
Current taxes payable	460	437

The tax rates of the two firms are as follows:
Tax rate for Firm X = 460/(1,000 - 0) = 46%
Tax rate for Firm Y = 437/(950 - 0) = 46%

This example illustrates the fact that interest expense (and indirectly leverage) made no difference in the effective tax rate of the two firms.

With respect to the concern embodied in the first example above (the adjustment which Stickney and McGee (1982) made to pretax book income in the denominator of their tax rate fraction), the use of tax rate definitions other than that of Stickney and McGee (1982) in a multivariate examination of corporate tax neutrality should address Bernard's criticisms regarding deferred tax components, since none of the other definitions have an adjustment for deferred taxes similar to that of Stickney and McGee(1982). With respect to the concern embodied in the second example above, only one of the tax rate definitions to be used in this study defines its tax rate base (denominator of the tax rate fraction) in such a manner as to deflect Bernard's criticism regarding leverage. The leverage criticism is adequately dealt with by the tax rate definition employed by Zimmerman (1983) with the denominator (or tax base) defined as sales less cost of goods sold. Therefore, Bernard's concern about leverage is dealt with by evaluating the leverage variable parameter in those regressions with the appropriately defined tax rate as the dependent variable. Also, weakness in this parameter for other tax rate definitions would support the complaint posited by Bernard (1984).

Zimmerman Study (1983)

For purposes of computing a COMPUSTAT based (worldwide) average effective corporate income tax rate, Zimmerman (1983) defined that rate as follows: Book income tax expense divided by operating cashflows. Income taxes consisted of total income tax expense [total federal (U.S.), foreign, state, and local income tax expense combined] minus the change in deferred taxes on the balance sheet. The author stated that his measure of income taxes approximates a firm's worldwide book income tax expense. Implicit in this calculation was an argument that components of deferred income tax expense (as represented in a company's financial statement) should not be treated as 'taxes paid' until the related timing differences reverse themselves. Operating cashflows were measured as the difference between sales and cost of goods sold. For purposes of this study, this ETR measure is referred to as Zimmerman's actual definition. This measure is justified by Zimmerman with the following explanations: (1) that it filters out the effects of the different accounting procedures used by firms to arrive at financial accounting income; and (2) that the more desirable measure of operating cashflows was unavailable for most of the years included in his study. The first argument is similar to that given by Stickney and McGee(1982) in support of their adjustment to pretax book income in the denominator of the tax rate fraction. The conclusions of this article regarding taxes and firm size conflict with those in Dworin

and Lynch (1984) , Siegfried (1974). Stickney and McGee (1982), and Porcano (1986).

This study will include a tax rate which utilizes the numerator noted above and operating cashflow from COMPUSTAT as the denominator. A footnote in Zimmerman (1983) noted that is ratio represented a better measure of ETR than the measure with cost of goods sold as the denominator. For purposes of this study, this ETR is referred to as Zimmerman's ideal definition.

Office of Tax Analysis Study (1977)

In an Office of Tax Analysis (OTA) paper on the pitfalls of effective tax rate computations, Fiekowsky (1977) outlines some corrections which he feels should be made to a naive tax rate consisting of the ratio of current federal (U.S.) tax expense to worldwide pretax income. The corrections which he suggests are as follows:

(1) Match domestic and foreign income and tax items.

(2) Choose an income measure based on either book or tax depreciation.

(3) Correct domestic income and tax expense for intercorporate dividends.

(4) Correct tax for refund with respect to prior year loss carryforwards.

(5) Correct domestic income and tax for current year investment credit.

(6) Correct tax for refund of prior year tax credit carryforward.

Correction (1) is self-explanatory. Given the Security and Exchange Commission's 1980 Accounting Series Release concerning the disclosure of the domestic and foreign components of pretax income, this correction should be less of an issue that it was in 1977. Correction (2) gives the tax rate analyst the choice of using tax depreciation as a crude proxy for economic depreciation or inflation adjusted depreciation. This choice should give a measure of income that is closer to "economic income" than a measure based on book depreciation.

Dividends paid by one corporation to another corporation represent after-tax income to the paying corporation. In order to mitigate the tax burden on this income stream, the Internal Revenue Code allows the receiving corporation a deduction equal, generally, to 85% of the dividends received (this percentage applied during the period under study but has been decreased by recent legislation) . Therefore the maximum tax that will be paid by the recipient corporation is 6.9% [(.46)(1 - .85)]. Since financial accounting income includes all of the dividends received, but financial accounting tax expense includes tax on only 15% of the dividends received, then it would appear that the dividend income stream is undertaxed. In reality, however, this income has already been taxed at the paying corporation level. A reasonable method for eliminating this bias is suggested in correction (3), in other words, remove intercorporate dividends

from the denominator of the tax rate fraction and the tax on dividends (presumably 6.9% of the dividends received) from the numerator.

Since Accounting Principles Board Statement 11 mandates that the effect of tax loss carryforwards be accounted for as an extraordinary item, then correction (4) will not be necessary if the tax rate is computed from information contained in the tax footnote of the annual report, using income before extraordinary items as a base.

Fiekowsky reasoned that subsidies should be accounted for similarly, regardless of whether they are direct transfer payments to taxpayers or indirect reductions of the tax liabilities of taxpayers through tax preferences. In keeping with this desire for symmetry, it is suggested that the current year investment tax credit be added to both the numerator and the denominator of the tax rate fraction. This describes correction (5).

In keeping with an objective of matching the current year's tax with the current years income, reductions in tax arising from the carryforward of tax credits (earned in prior years) should be backed out of the numerator of the tax rate fraction. This adjustment is the final correction suggested by Fiekowsky.

A more recent Treasury look at the problems of using financial statement data to estimate corporate taxes is provided in Dworin (1985).

McIntyre (1985)

McIntyre (1985) computed a U.S. tax rate on U.S. income as follows - the numerator of the tax rate fraction was defined as the current U.S. tax liability minus benefits obtained under the safe harbor leasing program (if not already factored in) and the denominator was defined as the company's operating income less current state and local income taxes. While no explicit rationale was given for utilizing current tax expense in the numerator, the implicit rationale is likely to be similar to those expounded in other studies. The theory behind the subtraction of state and local income taxes is probably similar to that underlying the Tax Notes (1982) method - that state and local income taxes are merely another deductible cost of doing business and that their inclusion only serves to muddy federal tax questions. An example of the critical commentary provoked by this study is provided in Egger (1985).

Porcano (1986)

Porcano (1986) used data from the Value Line Data Base-II tapes to examine the progressivity of the corporate income tax (as embodied in an average effective corporate income tax rate) with respect to the following criteria: (1) Capital Expenditures; (2) Net Income Before Taxes; (3) Total Assets; (4) Total Sales; and (5) Industry Classification. The author utilized a series of one way Analyses of Variance (ANOVA) to relate his definition of effective corporate income tax rate (the metric dependent

variable) to arbitrarily set levels (4) for each of the first four criteria noted above. His results identified the corporate income tax as being regressive and very low.

The effective tax rate was defined as follows. The numerator is current federal (or U.S.) income tax expense. The denominator is Net Income Before Taxes (including extraordinary items) less equity in unconsolidated affiliate earnings plus minority interest in income (loss) of consolidated subsidiaries.

The rationale for the use of current income tax expense as a measure of taxes paid was identified in previous reviews in this chapter. One weakness in this definition is the fact that where foreign tax rates exceed 46%, the use of federal (or U.S.) income tax expense as the numerator of the tax rate fraction will not account for all the income tax related to the worldwide income represented by the denominator. Another potential shortcoming is the inclusion in the denominator of extraordinary items (which are generally accounted for on a net of tax basis). This could tend to bias the tax rate in the same manner as the inclusion of equity in the earnings of affiliates. The adjustments to income in the denominator appear to be identical to those made by Vanik (1972-1980). The rationales for these adjustments can be found above.

Bernard and Hayn (1986)

Bernard and Hayn (1986) examine the effect of inflation on the cross sectional (interindustry) distribution of the burden of

the corporate income tax for the years 1961 - 1984 by utilizing a "real effective tax rate" of their own design. The authors conclude that, while some of the effects of inflation have been diluted by such provisions as accelerated depreciation, investment credit, and nominal interest deductibility, the cross industry variation in tax burden widened during the period examined.

The numerator of the tax rate fraction was defined as total income tax expense less net deferred income tax expense less tax benefits of net operating loss carryforward plus an adjustment for companies with wholly owned, unconsolidated subsidiaries. The denominator was defined as current cost income added to the purchasing power gain (loss). The variables making up the denominator were estimated for years prior to mandated inflation disclosures.

The first two components of the numerator equate to current income tax expense, the rationale for which has been repeated in several studies previously reviewed. The adjustment for the tax benefit of a tax loss carryforward represents a belief by the authors that mixing one year's income and blend of multiple years' income tax expense is an appropriate method for computing an ETR. If one believes that a single year's income and tax should be matched, then this adjustment would not be appropriate. The tax benefit of a tax loss carryforward is an extraordinary item and is not a component of total tax expense, at least as defined on Standard and Poor's COMPUSTAT database.

However, if a researcher's goal was computation of "taxes paid" during a certain year (regardless of the year to which the tax expense/refund relates), then this adjustment would be in order. The adjustment for wholly owned subsidiaries is identical to that suggested and justified by Dorgan and Pease (reviewed previously).

Wilkie (1988)

Wilkie (1988) used average effective corporate tax rates from a Tax Analysts' (publishers of Tax Notes) compilation edited by Marovelli (1986) and some COMPUSTAT data to focus on the relationship between changes in effective corporate income tax rates, tax preferences, and income. After a brief review of the prior literature, Wilkie (1988) mathematically develops a model of the relationship between inter-temporal tax rate changes and shifts in earnings and tax preferences. The relationships derived in this model show that a firm's effective corporate income tax rate is, in part, a function of both the variation in tax preferences and the variation and level of pretax income. This analytic derivation is supported by a series of conditional probability tables constructed by the author. These conditional probability tables were jointly based on the Marovelli (1986) data and the "tax preference hypothesis." The "tax preference hypothesis" holds that a firm with a greater (lesser) quantity of tax preferences compared to the preceding year will have a lower (higher) effective tax rate.

Wilkie and Limberg (1990)

Wilkie and Limberg (1990) use the 1989 COMPUSTAT data base to replicate and reconcile the results obtained in Zimmerman (1983) and Porcano (1986). The results of the replications of both Zimmerman and Porcano demonstrate that the same data base can produce vastly different relationships between firm size and ETR, according to the authors. The disparity in the results of the original studies is attributed to differences in sample selection procedure, ETR definitions, firm size measures, and data aggregation techniques.

Wang(1991)

Wang(1991) used path analysis to isolate the portion of the effect of firm size on ETRs that is attributable to net operating losses (NOLs). Based on data from a limited number of industries and computing an average tax rate over the six year period (1978 to 1983), the author concludes that NOLs constitute an important omitted variable in prior studies. This rationale is much less compelling where single year tax rates are computed without restriction on the denominator of the tax rate fraction. However, in order to accommodate the concept in Wang (1991), regressions will be performed which include variables averaged over the four year period (1980 to 1983) of the current study with the addition of an NOL frequency variable (defined by the presence of unused NOL carryforward).

Omer, Molloy, and Ziebart (1991)

Omer, Molloy, and Ziebart (1991) compute ETRs based on five formulas used in prior studies. These rates were computed using 1980 and 1983 COMPUSTAT data yielding a sample of approximately 1,100. Based on descriptive statistics, these authors conclude that deferred tax expense should be used in place of change in deferred tax liability and that researchers should evaluate the robustness of their inferences across different ETR measures.

Summary and Discussion of Financial Statement Rates

With regard to the numerator of the tax rate fractions reviewed above, one thing is fairly consistent: the choice of current portion of income tax expense or a closely related quantity [such as the total income tax expense less a substantial portion of the deferred income tax expense utilized in Marovelli (1986)] as the numerator of the tax rate fraction. The use of current income tax expense (whether worldwide, domestic, foreign, state and local income tax or a combination of these) as the numerator of the tax rate fraction seems to be a matter of consensus. The rationale for the use of this measure of "taxes paid" was roughly uniform across the research reviewed above. Deferred income tax expense merely increases the deferred credits for income tax on the balance sheet. These deferred

credits represent "contingent liabilities" which can be deferred indefinitely.

Beresford, Best, Craig, and Webber (1983) cite a number of arguments in favor of the flow through method of tax allocation. Use of this method results in no deferred taxes, and hence, the measure of income taxes under this method equates to current income taxes. Four arguments are advanced in favor of the flow through method. First, only taxable income matters, since only the combination of transactions and events which determine taxable income give rise to income taxes in a period. Therefore, that period is the appropriate time to recognize them. Second, income tax is not assessed on individual transactions. Taxes arise only from taxable income, which itself is a combination of events and transactions. No single event or transaction leads to tax assessment. Therefore, the association of taxes with specific events and transactions and the allocation of those taxes consistent with this association represent a tax expense recognition mechanism predicated on a nonexistent relationship. Third, allocation ignores uncertainties. inter-period tax allocation is based on assumptions about the future which may or may not prove true. Fourth, allocation is artificial smoothing. The use of inter-period tax allocation results in "smoothing" of reported earnings, thereby yielding an artificial measure of income. Further, managerial ability is partly reflected by the amount of income taxes actually paid. Use of inter-period tax allocation obscures this measure of tax minimization skill.

With regard to the denominator of the tax rate fractions reviewed above, a fairly consistent component was pretax income (whether worldwide, foreign, or domestic). However, the similarity stopped there. A variety of adjustments were made to pretax income in the studies analyzed. These adjustments can be broadly categorized as follows:

(1) Adjustments to resolve computational biases caused by the financial accounting for both consolidated and unconsolidated subsidiaries. Vanik (1972-1980 , Dorgan and Pease (1981 - 1984), and Tax Notes (1982).

(2) Adjustments to remove state and local tax effect from analysis of federal tax issues. Marovelli (1986) [Note: Dworin and Lynch (1984) and Wilkie (1986) used Tax Notes rates], Porcano (1986), Bernard and Hayn (1986).

(3) Adjustments to correct for the effect of differential accounting method selection on pretax income. Stickney and McGee (1982), and Zimmerman (1983).

(4) Adjustments to correct for the effects of inflation on nominal income. Bernard and Hayn (1986).

CHAPTER III

TAX RATE DEFINITION SELECTION

Given that the main data source is financial statement information, the next step in this process is to select some definitions from those financial-statement-based, effective corporate income tax rate definitions reviewed above (formulae are presented in Table 6).

The alternate tax rate definitions employed in the extensions to follow will be limited to definitions based on the ratio of worldwide corporate income tax to worldwide pretax income. The reasons for this approach are threefold. First, allocations of income between U.S. and foreign sources are arbitrary at best and are subject to such biases as transfer pricing at other than fair market value. Second, insufficient data is available to properly allocate deferred income tax expense components between U.S. and foreign sources for purposes of computing such rates as the Tax Notes U.S. and foreign income tax rates. Third, the use of other than worldwide rates would be inconsistent with the extensions of prior studies that are the main focus of this research. Since the tax rates defined by McIntyre (1985) and Fiekowsky (1977) are based on domestic measures, they will be eliminated from consideration.

The qualitative measures to be used to select tax rate definitions from the group of alternate tax rate definitions to be employed in the replication and extension to follow are(1) use in

TABLE 6
SUMMARY TABLE OF TAX RATES COMPUTED FROM FINANCIAL STATEMENT DATA

SHORT REFERENCE		NUMERATOR COMPONENTS	DENOMINATOR COMPONENTS
Vanik(1972-1980) [VANIK]	*1.	current income tax expense (federal(U.S.) + foreign) unconsolidated subsidiaries	worldwide pretax income- equity in earnings of minority interest in earnings of consolidated subsidiaries
	2.	current foreign tax expense	foreign pretax income
	3.	current federal(U.S.)tax expense	1 minus 2
	4.	current federal(U.S.)tax expense	same as 1
Dorgan and Pease(1981-84) [DORPEA]	* 1.	current income tax expense (federal(U.S.) + foreign)	worldwide pretax income- net earnings of wholly owned finance subsidiaries accounted for using the equity method (but special combined computation where finance subsidiary generates substantial tax benefits.)
	2.	current foreign income tax expense	foreign pretax income
	3.	current federal(U.S.)income tax expense	1 minus 2
Tax Notes(1982) * Dworin and Lynch (1984), Wilkie (1988), Marovelli (1986) [TXNT]	1.	Total income tax expense -state/local income tax exp -most components of deferred income tax expense	Pretax book income - state and local income taxes - equity in income of unconsolidated subs + other taxable income not included in operating income (capital gains,etc.)
	2.	Total U.S. income tax expense - most deferred income tax components	1 less foreign pretax income
	3.	Current foreign income tax expense	foreign pretax income

TABLE 6 CONTINUED

SHORT REFERENCE	NUMERATOR COMPONENTS	DENOMINATOR COMPONENTS
Stickney and McGee (1982) [STICKN] *	Current income tax expense (Federal, foreign, state, and local)	Pretax book income less (deferred tax expense divided by statutory tax rate)
Zimmerman(1983) * [ZIMMRA] (actual definition)	Total income tax expense (federal, foreign, state, and local) - change in deferred tax balance sheet account	Gross profit
Zimmerman(1983) * [ZIMMER] (ideal definition)	Total income tax expense (federal, foreign, state, and local) - change in deferred tax balance sheet account (beginning to end of year)	Cash flow from operations
McIntyre (1985)	current income tax expense (federal or U.S. only) - benefits derived under safe harbor leasing (if not accounted for)	domestic operating income - state and local income tax
Porcano(1986)	current income tax expense (federal or U.S. only)	Pretax book income - equity in affiliate earn.+ minority interest in earnings of consolidated subsidiaries
Bernard and Hayn (1986)	total income expense(all)- net deferred income tax expense-tax benefit of net operating loss carryforward	Current Cost Income + Purchasing Power Gain +/- adjustment for wholly owned subsidiaries

Note: See also Fiekowsky(1977), for suggestions on modifications to tax rate
Note: ASTERISKS INDICATE DEFINITIONS TO BE USED IN THIS STUDY.

prior research, (2) data availability, and (3) the matching of tax expense and income of a given year.

A financial statement based inflation adjusted rate definition reviewed earlier was defined by Bernard and Hayn (1986). One element of their definition appears to lack theoretical support, given the matching principle noted above. The adjustment to the numerator for the tax benefit of a tax loss carryforward violates the matching principle in that it involves mixing a tax benefit from one period with the income allocable to another period, a bias which Fiekowsky (1977) suggests needs to be corrected. The concerns above justify the exclusion of this rate definition from the group of definitions to be utilized in this study.

Porcano (1986) proposes a tax rate definition which utilizes only current federal (or U.S.) income tax expense in the numerator. Since this research is limited to the use of worldwide tax ratios the inclusion of Porcano's tax rate definition in the alternate rate group is inappropriate. Perhaps the author felt that current federal (or U.S.) income tax expense is an appropriate measure of income tax "paid" on the worldwide income included in the denominator of his fraction. Unfortunately, theoretical support for this assumption breaks down where foreign income tax rates exceed 46%. Where this occurs, the numerator of the tax rate fraction (as defined by Porcano) cannot possibly account for all the income tax related to the worldwide income represented by the denominator. This

theoretical anomaly justifies exclusion of Porcano's tax rate definition.

The worldwide tax rate definitions not eliminated in this discussion are noted by asterisk in Table 6 and will be utilized in this study.

CHAPTER IV

HYPOTHESIZED RELATIONSHIPS

The hypotheses noted below, plus some additional hypotheses will be examined employing data from 527 companies for the 1980 through 1983 fiscal years. The independent variable names are generally described below. The parenthetical variable notations indicate the subset of Stickney and McGee (1982) variables (see Table 5) used in this research. Additional hypotheses will be discussed after the rationales for the five initial hypotheses are outlined.

Stickney and McGee (1982) hypothesized that the following five factors would share a relationship with effective tax rate:

(1) Degree of capital intensity (CAPINTA)

(2) Extent of foreign operations (FSPROP)

(3) Extent of natural resources involvement (NSPROP)

(4) Size of firm (ASTLN)

(5) Proportion of debt in capital structure (DBTSE)

The rationales and directional expectations underlying these five hypotheses are discussed below.

(1) Degree of Capital Intensity. Based on investment credit and accelerated tax depreciation methods meant to stimulate investment in tangible, depreciable property, it is reasonable to presume that the larger the investment in depreciable property, the larger the tax savings should be. This should lead to a lower effective tax rate for capital intensive firms.

(2) Extent of Foreign Operations. A review of Deloitte, Haskins, and Sells (1988) revealed that a majority of fifty-one countries reviewed have a corporate income tax rate greater than 46%. Revisions by country generally predated the overall revision date (September, 1988) of Deloitte, Haskins, and Sells (1988) by several years, making the period covered roughly contemporaneous with the period of the present study. While a corporation receives a credit against its U.S. corporate income tax (computed, in general, on worldwide income) for income taxes paid to foreign governments (§901 of Internal Revenue Code (I.R.C.)), if the foreign tax rate faced by the corporation is higher than the U.S. statutory rate, then the excess will not be creditable, thereby resulting in an overall corporate income tax rate higher than the U.S. statutory rate (due to the limitation on the foreign tax credit imposed by I.R.C. §904) Thus foreign involvement should be positively related to effective tax rate.

(3) Extent of Natural Resource Involvement. In support of negative directional natural resource involvement, percentage depletion (except for large oil companies), immediate expensing of exploration and development expenditures relating to mineral resources, and the capital gain treatment accorded certain interests in timber, petroleum rights, and coal rights might be listed as items which reduce taxes and therefore effective tax rates.

(4) Size of Firm. Based on the results of Siegfried (1972), Stickney and McGee (1982), and Dworin and Lynch (1984), a

negative relationship between size and effective tax rate is predicted. Larger firms have greater resources available for purposes of lobbying and hiring tax experts, and should therefore enjoy lower taxes and effective tax rates as a result of this resource allocation.

(5) Proportion of Debt in the Capital Structure. Based on Stickney and McGee's results with respect to leverage, a negative relationship between effective tax rate and leverage is hypothesized. Bernard (1984) noted that this variable came through in the Stickney and McGee study even though it should not.

Additional Hypotheses

An additional hypothesized relationship relates to the findings of Wilkie (1988). Wilkie analytically derived and empirically supported a notion that the level of ETR relates not only to the amount of tax preferences but also to the level of income. Therefore it is hypothesized the level of income is positively related to the level of ETR. If analysis indicates that inclusion of this variable creates a serious violation of some regression assumption, then hypothesis testing could be restructured such that portfolios of firms would be formed based on the level of income, instead of explicitly considering that as a variable.

After a review of several hundred footnotes from the National Automated Accounting Research System (NAARS) database, this researcher has observed that export sales through

a DISC (Domestic International Sales Corporation) are generally counted as domestic sales in segment breakdowns of foreign versus domestic sales. Therefore, the foreign involvement variable does not capture the potential tax reduction achieved through export. Since a DISC allows the deferral of tax on a portion of export earnings, then the use of a DISC should act to lower the effective tax rate of a corporation. It is therefore hypothesized that the export involvement embodied by the existence of a DISC subsidiary (as denoted in the Marovelli (1986) tax rate compilation) will be negatively related to the ETR. Export involvement will be operationalized through the use of a dummy variable (1=DISC, 0=No DISC).

Expanded Set of Hypothesized Relationships

Based on the above discussion, the hypothesized relationships of tax rate with the expanded set of independent variables will be as follows:

Independent Variables	Relates to ETR
Degree of capital intensity	-
Foreign involvement (foreign sales/total sales)	+
Export involvement (dummy variable)	-
Extent of natural resources involvement	-
Size of firm	-
Proportion of debt in capital structure (leverage)	-
Level of Income	+

CHAPTER V

DATA

Two obvious restrictions in the data need to be justified: the number of years considered and the restriction to the Tax Notes companies. The data employed in Stickney and McGee (1982) were for the 1980 year, while the data employed in the Zimmerman (1983) study went through the 1981 year. A longitudinal pre/post view of the Economic Recovery Tax Act of 1981 (which may have some effect on the relationship between capital intensity and ETR) should be adequately provided by the consideration of the 1980 through 1983 years. Marovelli (1986) includes a compilation of Tax Notes data for the period under study.

The Tax Notes worldwide tax rate definition is included as one of the six tax rate definitions tested in this study. This rate definition was painstakingly compiled by Tax Notes, which individually examined 527 firms throughout a several year period. Since these compilations were done in such a rigorous manner, that is, firm and industry specific factors such as growth/declining trends were made part of the compilation, then the Tax Notes rate definition is an important addition to any study which examines the impact of rate definitions. Further recommending this compilation is the fact that Tax Notes analysts attempted to contact every firm and obtain confirmation of their analysis.

The data to be used is the result of the intersection of the companies in the Tax Notes compilation (Marovelli (1986)) , COMPUSTAT (a financial statement database), and the NAARS database for the years 1980 through 1983. Certain variables necessary for the study to be performed were not available from COMPUSTAT or Tax Notes and hence had to be extracted from NAARS.

The following variables were extracted for each of 527 companies for the years 1980 through 1983 subject to data availability:

1. Company Name
2. CUSIP number
3. Total assets (from COMPUSTAT)
4. Gross Plant (from COMPUSTAT)
5. Net Plant (from COMPUSTAT)
6. Long Term Debt (from COMPUSTAT)
7. Sales (from COMPUSTAT)
8. Total tax expense (from COMPUSTAT)
9. Operating Income (from COMPUSTAT)
10. Number of Employees (from COMPUSTAT)
11. Deferred Tax and Investment Credit (from COMPUSTAT)
12. Minority Interest in Income (from COMPUSTAT)
13. Deferred Tax Expense (from COMPUSTAT)
14. Investment Credit (Income Statement) (from COMPUSTAT)
15. Common Equity (from COMPUSTAT)

16. Federal Tax Expense (from COMPUSTAT)
17. Foreign Tax Expense (from COMPUSTAT)
18. Funds from Operations (from COMPUSTAT)
19. Preferred Stock carrying amount (from COMPUSTAT)
20. SIC code (from COMPUSTAT)
21. Foreign Sales (from NAARS)
22. Natural Resource Sales (from NAARS)
23. Total Sales (from NAARS for purposes of comparability with natural resource or foreign sales derived from segment data)
24. Equity in net earnings of Wholly Owned Subs accounted for under the equity method. (from NAARS)
25. Tax expense of aforementioned Subs (from NAARS)
26. Pretax income of aforementioned Subs (from NAARS)
27. Equity in the Earnings of all unconsolidated Subs (from COMPUSTAT)
28. Worldwide Tax Rate (from Tax Notes)
29. Worldwide Pretax Income (from Tax Notes)
30. Cost of goods sold (from COMPUSTAT)
31. Interest expense (from COMPUSTAT)
32. Unused NOL carryforward (from COMPUSTAT)
33. DISC dummy variable (derived from Tax Notes)

CHAPTER VI

METHODOLOGY

Four sets (one each for 80 through 83 years) of multiple regressions for each tax rate definition will be performed using the 5 independent variables noted in the Stickney and McGee (1982) study, a level of income variable to accommodate the findings of Wilkie (1988), and an export involvement (another form of foreign involvement) variable. ETRs computed according to six different effective tax rate definitions will be the six separate dependent variables. (See Table 6 for definitions of the tax rates to be utilized). The hypothesized relationships of tax rate with independent variables are noted in the hypothesized relationships chapter.

Analyses will be performed for each year and each ETR definition with all possible firms included , but with tax rate outliers eliminated (filtered at plus or minus two hundred percent). The all inclusive computations result in varying numbers of observations for different tax rate definitions, which somewhat limits comparability.

In order to accommodate the concept that net operating loss frequency is a moderating variable in the relationship between firm size and effective tax rate, as discussed in Wang (1991), regressions will be performed which include variables averaged over the four year period (1980 to 1983) of the current study with the addition of an NOL frequency variable (defined by the presence of unused NOL carryforward).

In order to evaluate how changes in firm characteristics relate to changes in ETRs, change variables will be computed for differences between each dependent and independent variable and regressions will be performed utilizing these change variables, with the exception of the DISC variable, which is constant on an intra-firm basis over the period studied. These regressions should allow at least an indirect view of the effect of tax legislation and macroeconomic factors during the period being studied (1980-1983).

A more formal presentation of the basic regression model is noted below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon$$

where:

$Y=$ the effective tax rate

$X_1=$ capital intensity

$X_2=$ extent of natural resource involvement

$X_3=$ extent of foreign involvement

$X_4=$ export involvement (1=DISC, 0=No DISC)

$X_5=$ size

$X_6=$ proportion of debt in capital structure (LEVERAGE)

$X_7=$ level of income (log of pretax book income)

$\varepsilon=$ error term

The test of the hypotheses will be provided by examining the sign of the regression coefficients and whether they are significantly different from zero. The null and alternate hypotheses are formally stated as follows:

Capital Intensity Hypothesis:

H_o: $\beta_1 = 0$

H_a: $\beta_1 < 0$

Natural Resource Involvement Hypothesis:

H_o: $\beta_2 = 0$

H_a: $\beta_2 < 0$

Foreign Involvement Hypothesis:

H_o: $\beta_3 = 0$

H_a: $\beta_3 > 0$

Export Involvement Hypothesis:

H_o: $\beta_4 = 0$

H_a: $\beta_4 < 0$

Size Hypothesis:

H_o: $\beta_5 = 0$

H_a: $\beta_5 < 0$

Leverage Hypothesis:

H_o: $\beta_6 = 0$

H_a: $\beta_6 < 0$

Level of Income Hypothesis:

H_o: $\beta_7 = 0$

H_a: $\beta_7 > 0$

For each year being reviewed, there will be regressions of six different dependent variables on the same set of independent variables. Informal intrayear comparisons between the regressions can be made by juxtaposing coefficients in the regression result tables. In order to make formal comparisons between these regressions within a given year, the use of multivariate regression models is necessary. The specific contribution of the multivariate regressions is to allow statistically rigorous comparisons between regression coefficients for a given year. Hypotheses can be estimated using multivariate regressions models where several dependent variables are fit to the same regressors. These models are of the following form:

$(\mathbf{L}\beta - \mathbf{cj})\mathbf{M} = 0$, where

L is a linear function on the regressor side,

β is a matrix of parameters,

c is a column vector of constants

j is a row vector of ones, and

M is a linear function on the dependent side.

To test interyear hypotheses, two matrices (called H and E) are constructed (SAS, 1985) that correspond to the numerator and denominator of a univariate F test:

$$\mathbf{H} = \mathbf{M}'(\mathbf{L}\beta - \mathbf{cj})'(\mathbf{L}(\mathbf{X}'\mathbf{X})^{-1}\mathbf{L}')^{-1}(\mathbf{L}\beta - \mathbf{cj})\mathbf{M}$$

$$\mathbf{E} = \mathbf{M}'(\mathbf{Y}'\mathbf{Y} - \beta'(\mathbf{X}'\mathbf{X})\beta)\mathbf{M}$$

Four test statistics, based on the eigenvalues of $\mathbf{E}^{-1}\mathbf{H}$ or $(\mathbf{E}+\mathbf{H})^{-1}\mathbf{H}$ will be formed. These test statistics are Wilks' Lambda, Pillai's Trace, the Hotelling-Lawley Trace, and Roy's maximum root. These test statistics (SAS, 1985) are formulated as follows:

Wilks' Lambda:

$\Lambda = \det(\mathbf{E})/\det(\mathbf{H}+\mathbf{E}) = \Pi\ 1/(1+\lambda_i) = \Pi(1+\xi_i)$

Pillai's Trace:

$\mathbf{V} = \text{trace}(\mathbf{H}(\mathbf{H}+\mathbf{E})^{-1}) = \Sigma\lambda_i/(1+\lambda_i) = \Sigma\xi_i$

Hotelling-Lawley Trace:

$\mathbf{U} = \text{trace}(\mathbf{E}^{-1}\mathbf{H}) = \Sigma\lambda_i = \Sigma\xi_i/(1-\xi_i)$

Roy's Maximum Root:

$\Theta = \lambda_i$, where

ξ_i are the ordered eigenvalues of $(\mathbf{E}+\mathbf{H})^{-1}\mathbf{H}$,

$\xi_i = \lambda_i/(1+\lambda_i)$,

$\lambda_i = \xi_i/(1-\xi_i)$, and

$\rho_i = \sqrt{\xi_i}$ = ith canonical correlation.

The following general hypotheses can be tested, given the above formulations:

H_o: β_i is the same each Y_j, where i=1-7 and j=1-6

H_a: β_i is not the same for each Y_j, where i=1-7 and j=1-6

For purposes of performing multiple regression analysis, the following conventions will be followed with respect to naming variables:

Dependent Variables

TXNTnn=ETR computed according to Tax Notes definition for year nn.

VANIKnn=ETR computed according to Rep. Vanik definition for year nn.

DORPEAnn=ETR computed according to Dorgan and Pease definition for year nn.

STICKNnn=ETR computed according to Stickney/McGee definition for year nn.

ZIMMERnn=ETR computed by Zimmerman ideal definition for year nn.

ZIMMRAnn=ETR computed by Zimmerman actual definition for year nn.

Independent Variables

Natural Resource Involvement Variable

NSPROPnn=natural resource sales / total sales for year nn.

Foreign Involvement Variable

FSPROPnn=foreign sales / total sales for year nn.

Capital Intensity

CPINTAnn=gross plant assets/total assets for year nn.

CPINTBnn=net plant assets/total assets for year nn.

CPINTCnn=ln(depreciation expense)/number of employees for year nn.

CPINTDnn=ln(gross plant assets)/numbeer of employees for year nn.

Size

ASTLNnn=ln(total assets) for year nn.

SLSLNnn=ln(total sales for year nn.

Leverage

DBTSEnn=long-term debt/stockholder's equity for year nn.

DBTTEnn=long-term debt/total equity for year nn.

Extension Variables

Level of Income variable

LEVINCnn= ln(pretax book income)

Export Involvement variable

DISCnn= 1 if DISC exists, 0 if no DISC for year nn.

CHAPTER VII

RESULTS

Correlations Among Independent Variables

Correlations between the independent variables are illustrated in Table 3. These correlations range between -.29 and .561 and are significant for the most part. The only correlation among the independent variables of any particular consequence is the one between the income level variable and the size variable. These two variables are hypothesized to be related to tax rate with opposite signs. This correlation is not belied by the variance inflation factor of these variables for the regressions in question, meaning that multicollinearity is not a problem. One might draw an opposite conclusion by looking at the correlations only.

Correlations Among Tax Rates

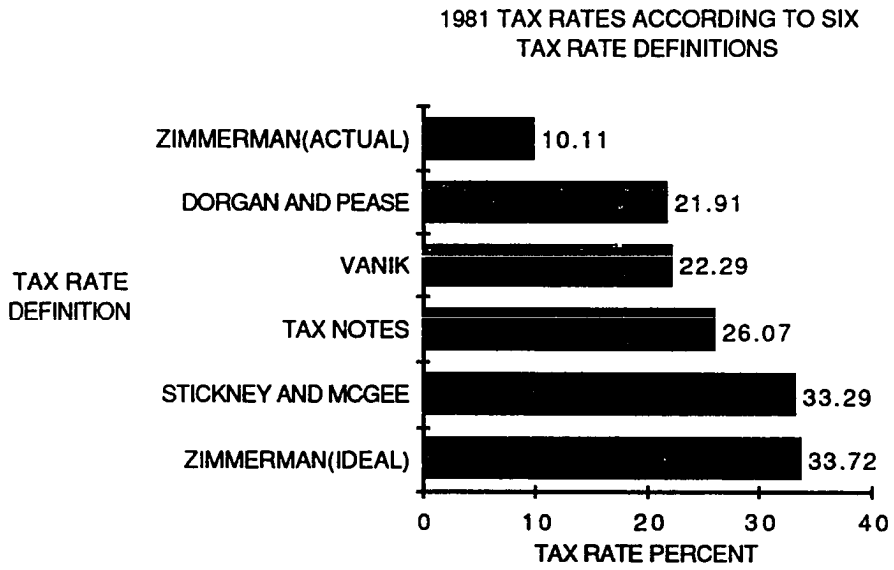
Correlations among the tax rate definitions are in Table 4. For the most part these correlations are significant. These correlations varied from -.023 to .999. The highest correlations were between the Congressman Vanik tax rate definition and the Congressmen Dorgan and Pease definition. This result is not surprising, given the minimal difference between these two rates. One might question whether regressing significantly correlated tax rates on the same set of independent variables would be worthwhile. The variation in the regression results discussed below provide a positive answer to this question.

Trends in Tax Rates

Based on the univariate statistics shown in Table 2 and the average dependent variable amounts for the regressions, graphs were assembled which illustrate the trends in the tax rates across years by definition and across definitions by year. These graphs comprise Figures 1 through 10.

Figures 1 through 4 illustrate the relative rankings of the untrimmed tax rates (from the univariate statistics) and the trimmed tax rates (a filter of +/- two hundred percent) for the years 1980 though 1983. The most notable shift in the 1980 data in Figure 1 is movement of Zimmerman's ideal definition from the highest of six untrimmed tax rates to the second lowest of the trimmed tax rates. This shift is indicative of the presence of extreme positive outliers for this tax rate. Also, the average trimmed tax rate of Zimmerman's actual rate is approximately forty percent of the untrimmed rate. This is another indicator of extreme positive outliers. The most notable shift in the 1981 data in Figure 2 is movement of Zimmerman's ideal definition from the second lowest of six untrimmed tax rates to the highest of the trimmed tax rates. This shift is indicative of the presence of extreme negative outliers for this tax rate. Also, the average trimmed tax rate of Zimmerman's actual rate is approximately two and half times greater than the untrimmed rate. This is another indicator of negative extreme outliers. The most notable shift in the 1982 data in Figure 3 is the movement of Stickney and

FIGURE 1
GRAPHS OF TAX RATES
FOR THE YEAR 1980



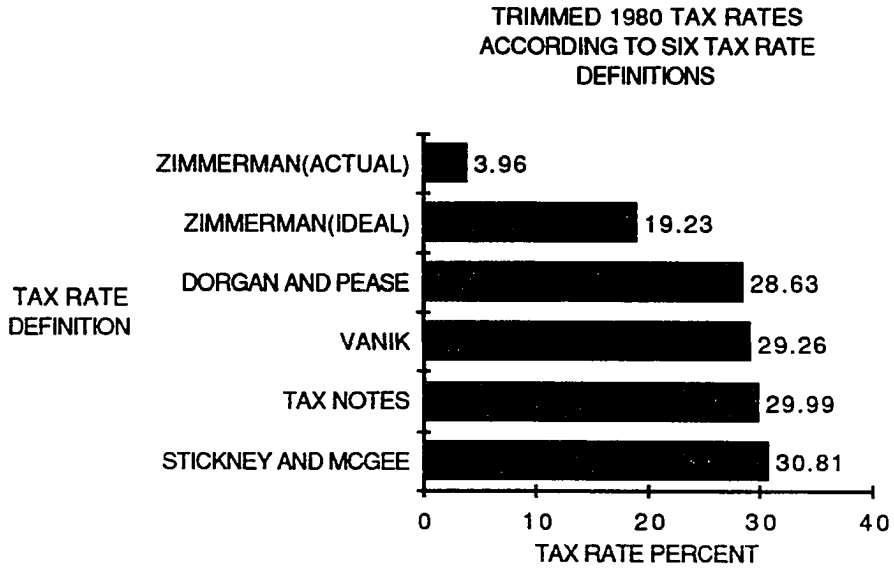


FIGURE 2
GRAPHS OF TAX RATES
FOR THE YEAR 1981

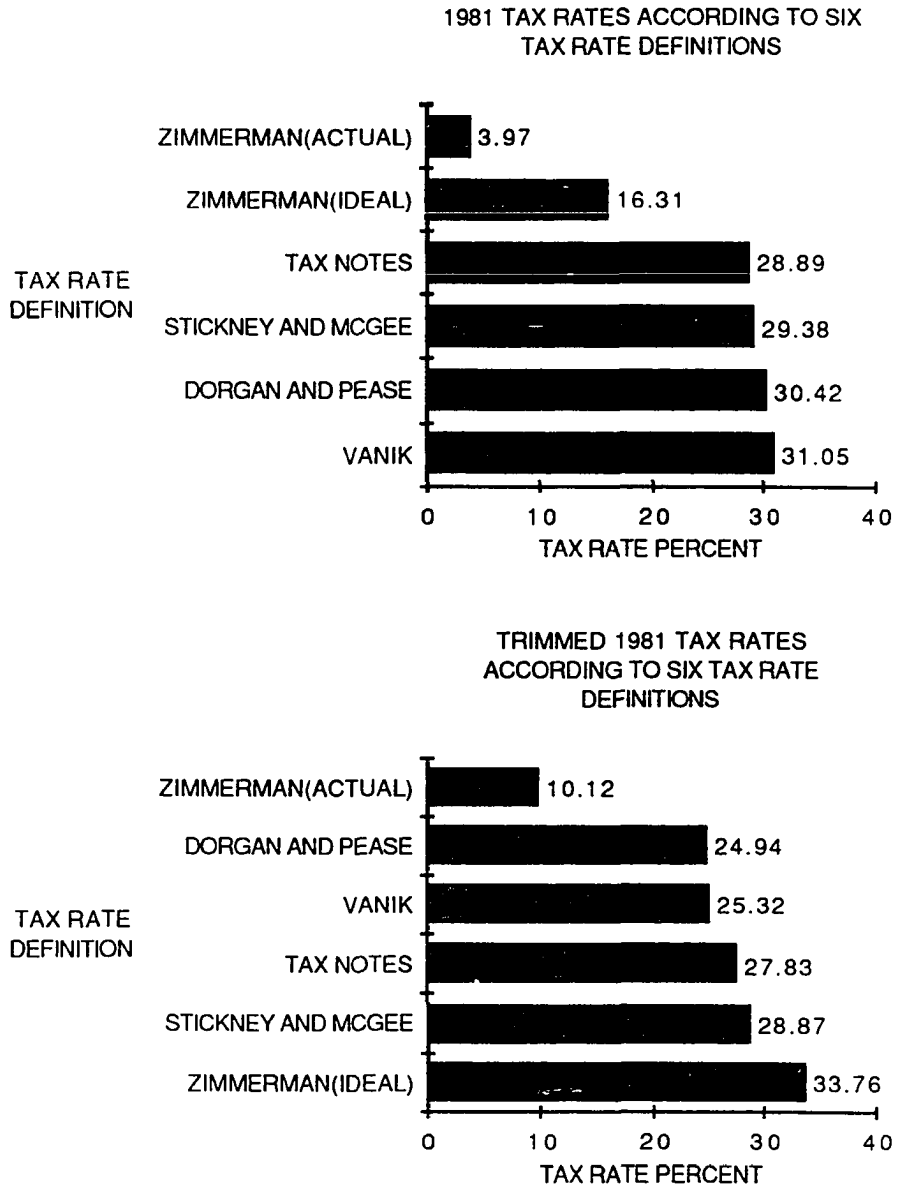
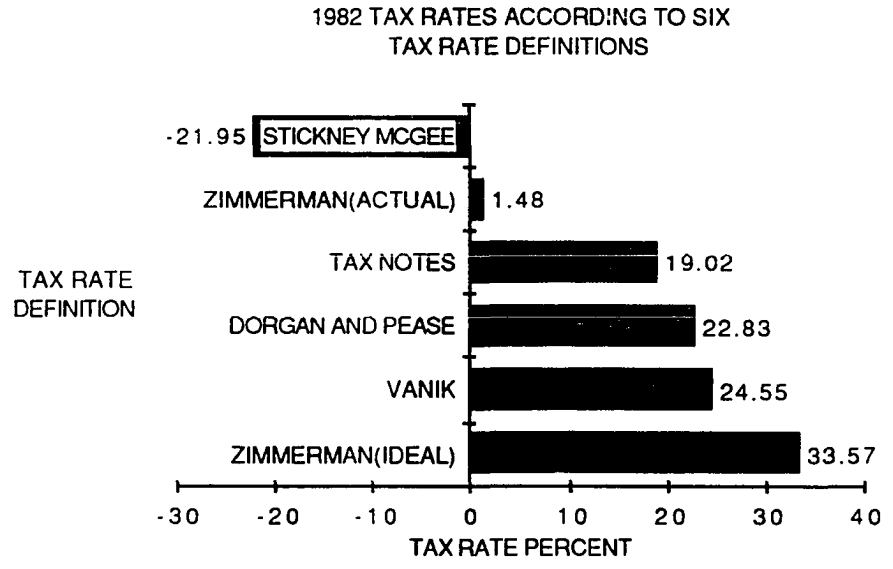


FIGURE 3
GRAPHS OF TAX RATES
FOR THE YEAR 1982



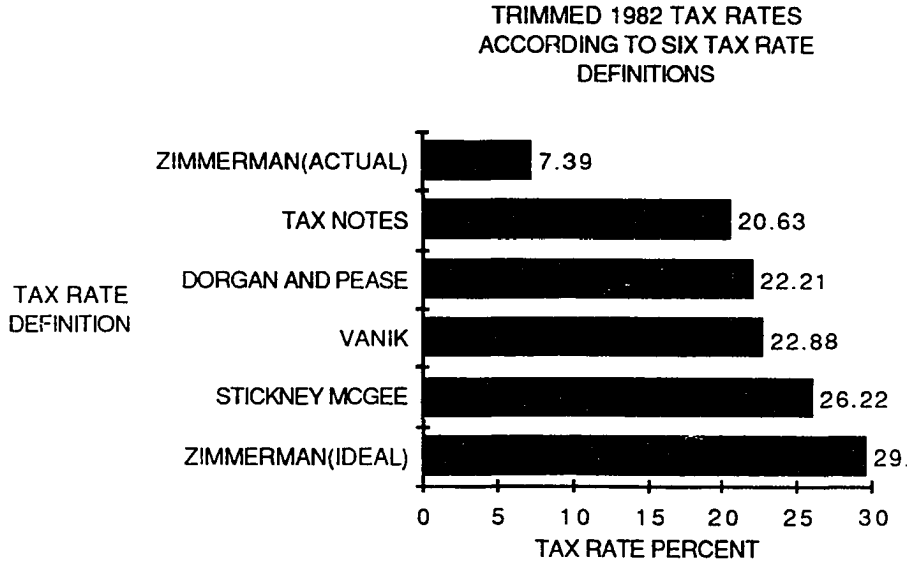
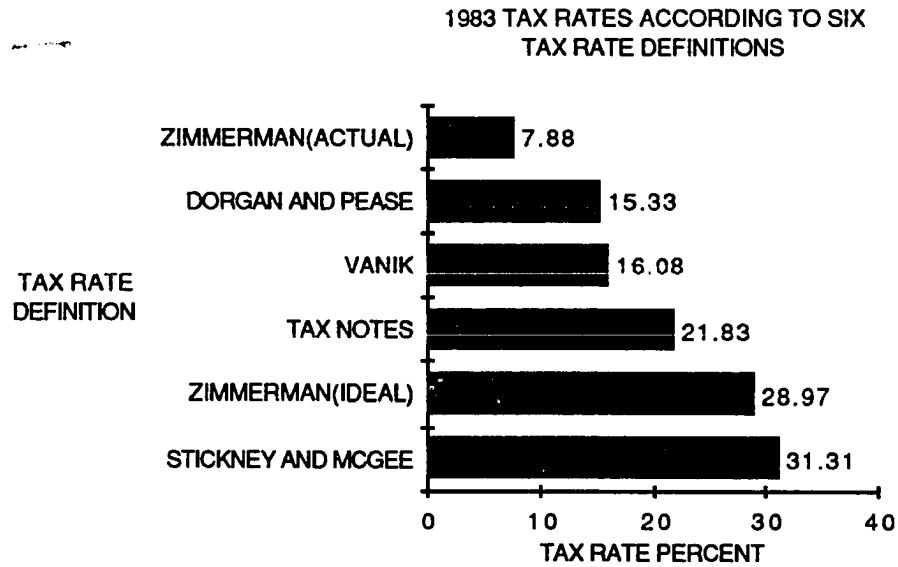


FIGURE 4
GRAPHS OF TAX RATES
FOR THE YEAR 1983



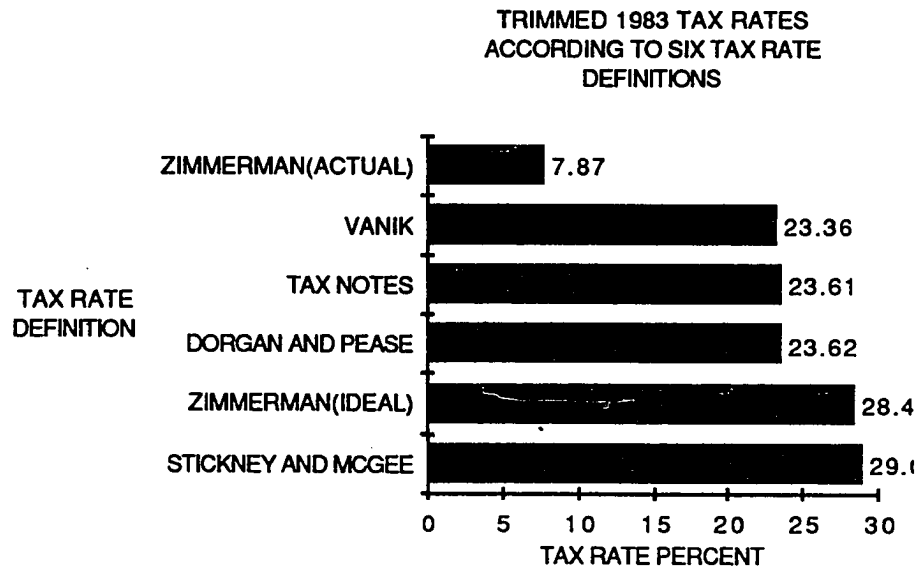
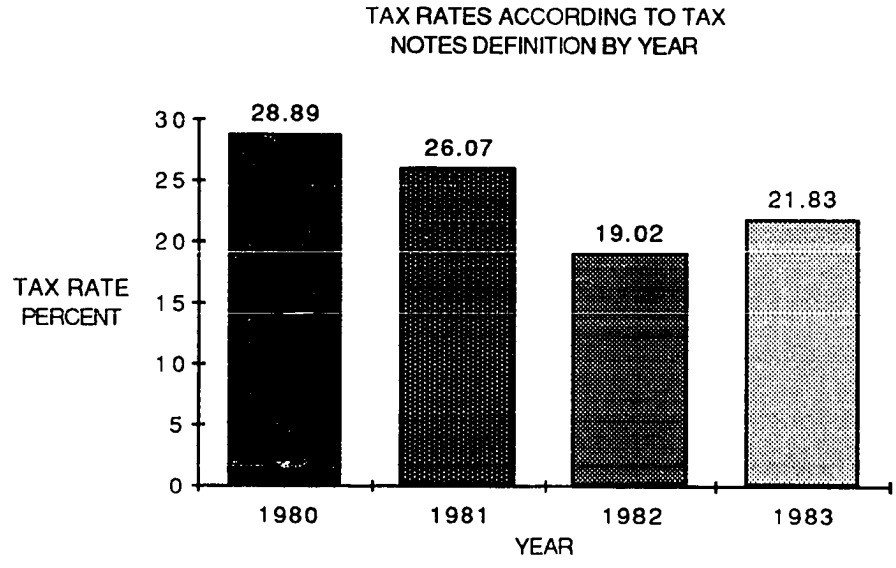


FIGURE 5
TAX RATES ACCORDING TO
TAX NOTES DEFINITION FOR
YEARS 1980 THROUGH 1983



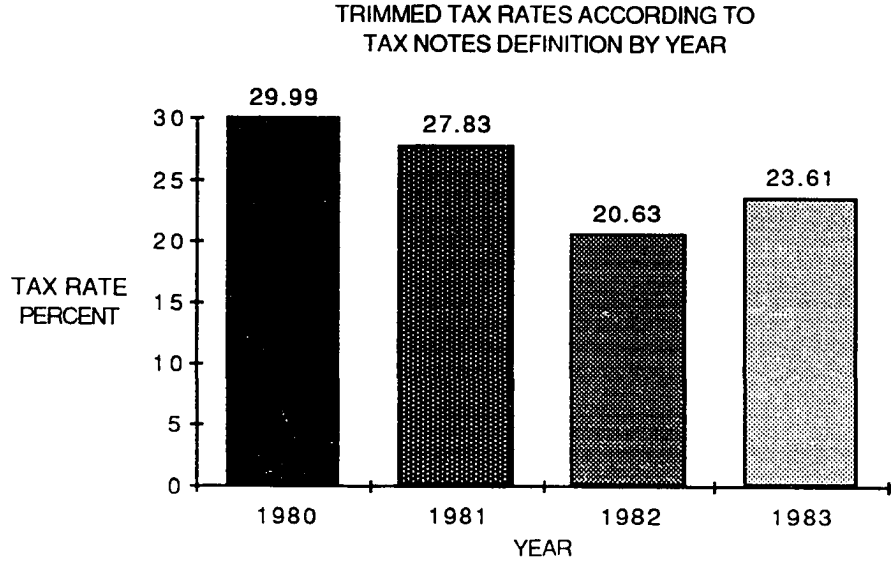


FIGURE 6
TAX RATES ACCORDING TO
VANIK DEFINITION FOR
YEARS 1980 THROUGH 1983

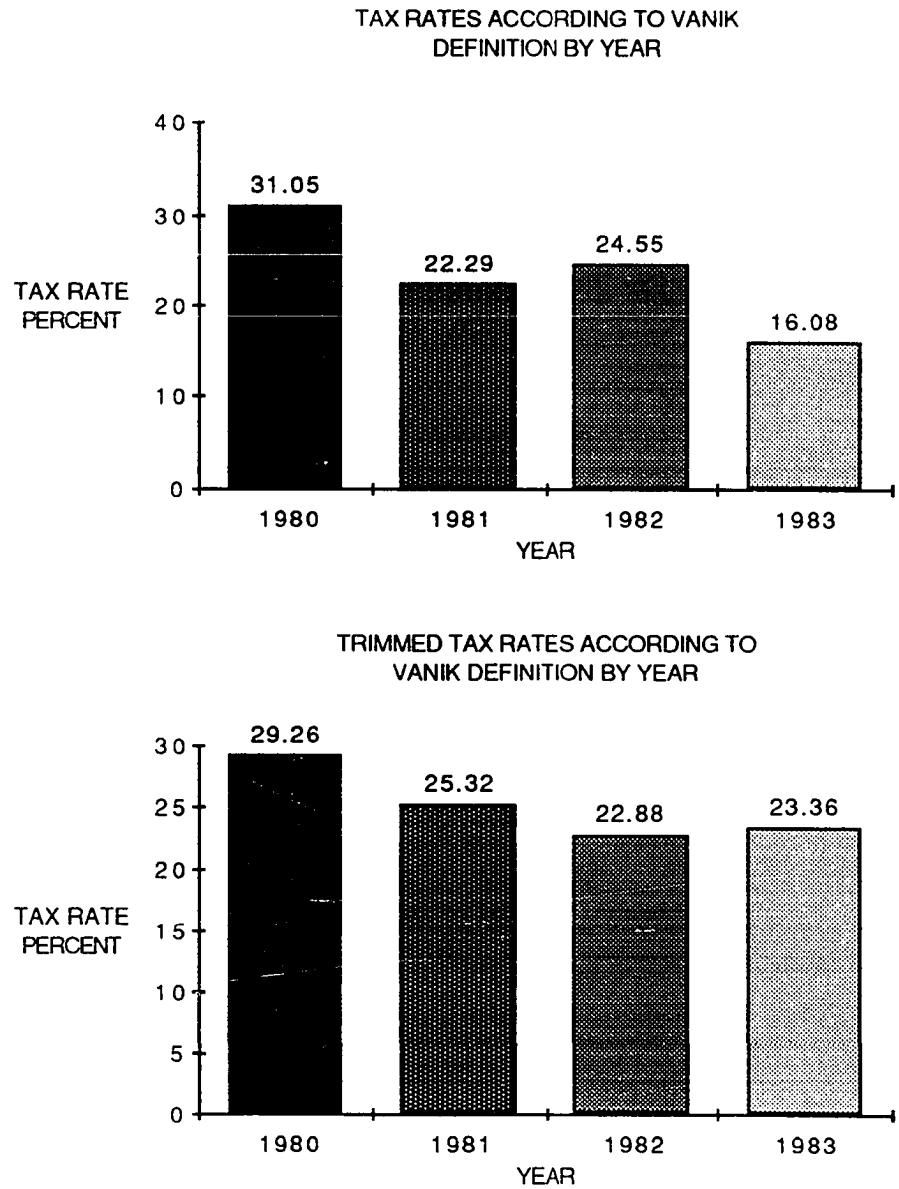


FIGURE 7
TAX RATES ACCORDING TO
DORGAN/PEASE DEFINITION FOR
YEARS 1980 THROUGH 1983

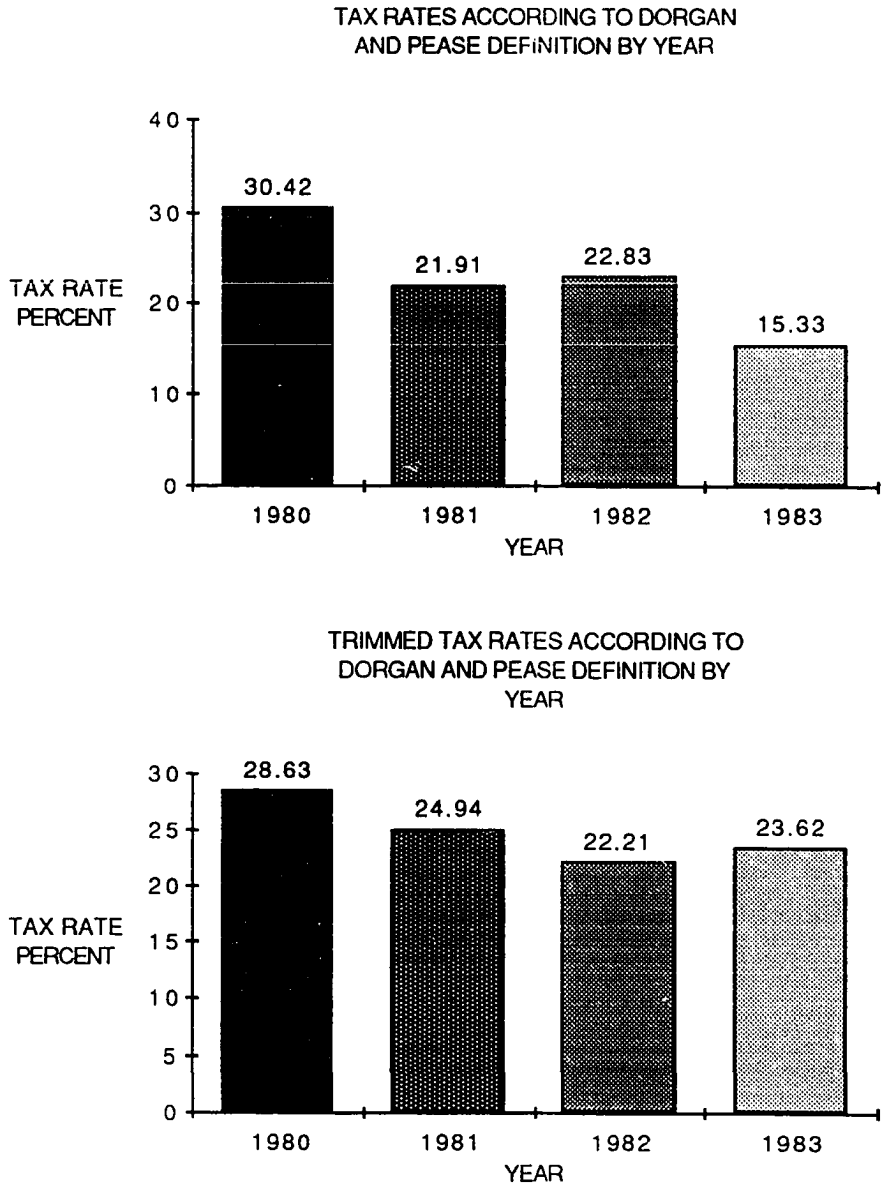
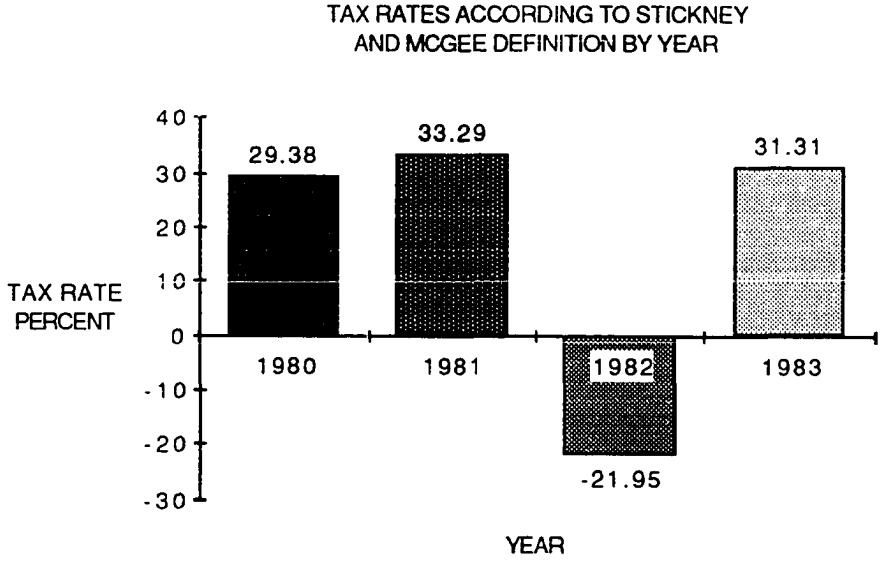


FIGURE 8
TAX RATES ACCORDING TO
STICKNEY AND MCGEE DEFINITION FOR
YEARS 1980 THROUGH 1983



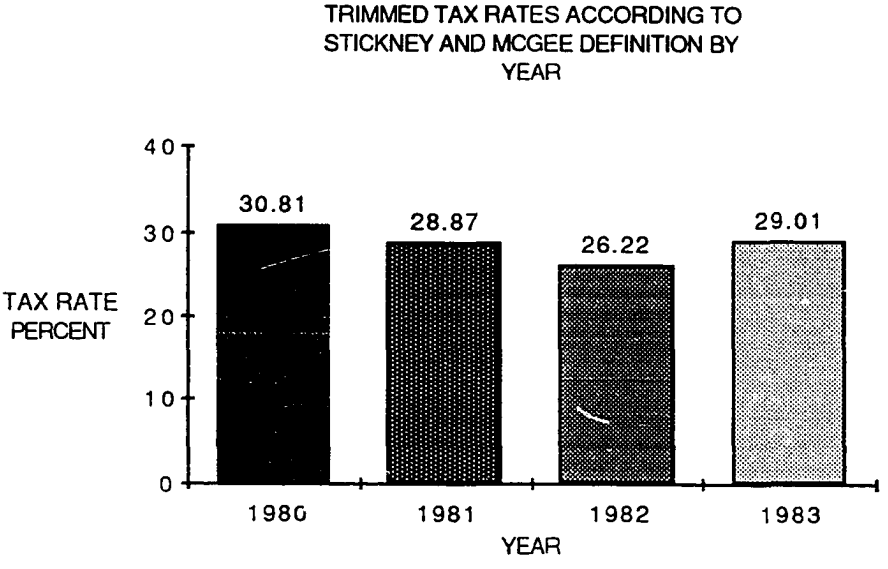


FIGURE 9
TAX RATES ACCORDING TO
ZIMMERMAN IDEAL DEFINITION FOR
YEARS 1980 THROUGH 1983

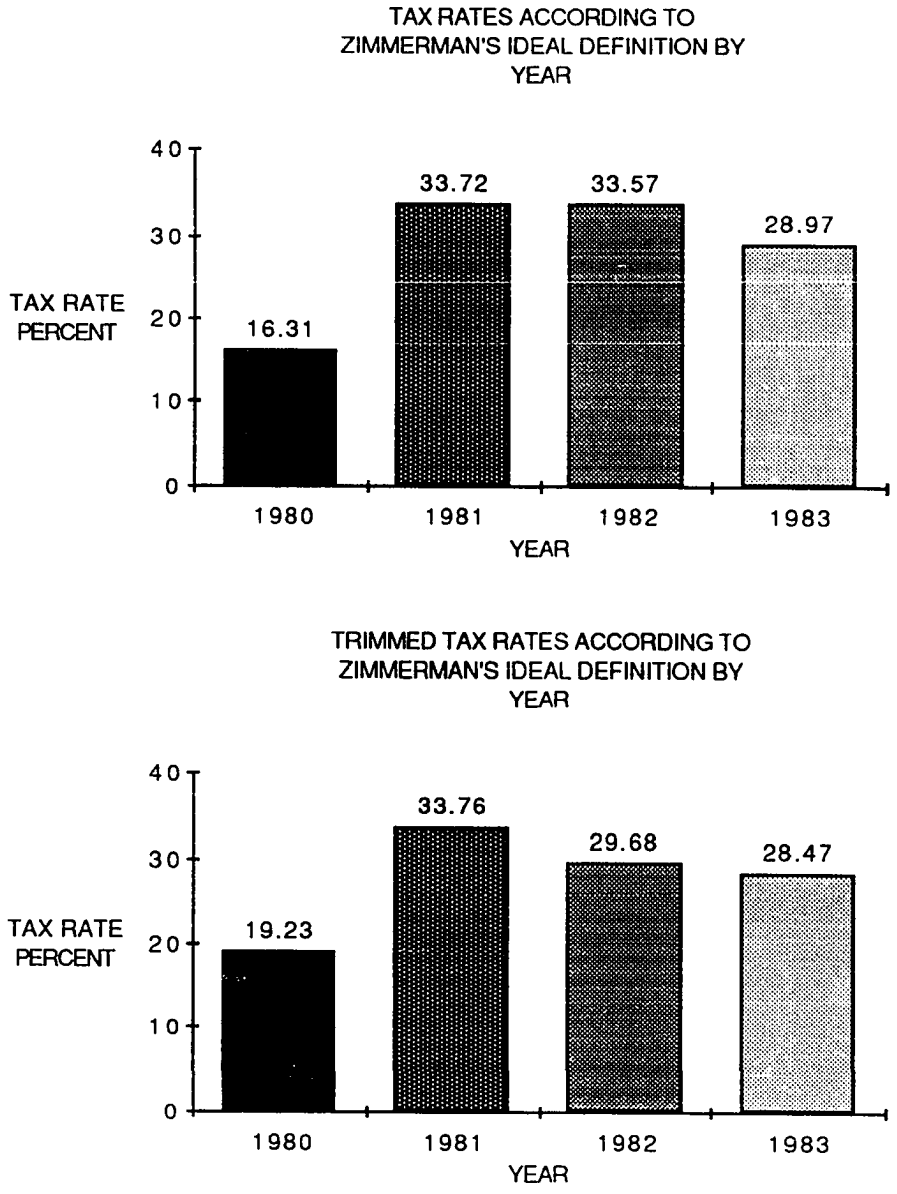
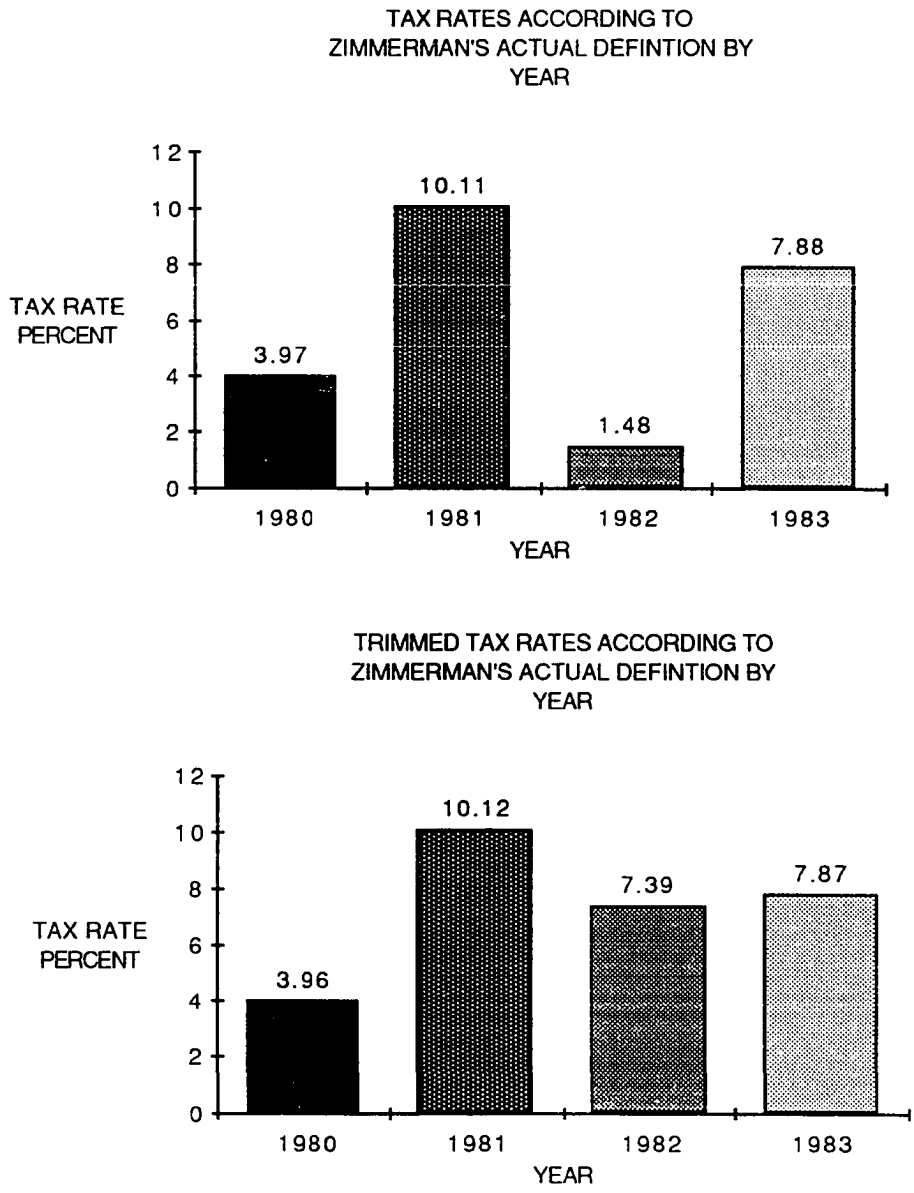


FIGURE 10
TAX RATES ACCORDING TO
ZIMMERMAN ACTUAL DEFINITION FOR
YEARS 1980 THROUGH 1983



McGee's definition from the lowest of six untrimmed tax rates to the second highest of the trimmed tax rates. This movement is indicative of the presence of extreme negative outliers for this tax rate. Also, the average trimmed tax rate of Zimmerman's actual rate is approximately five times greater than the untrimmed rate. This proportion is another indicator of negative extreme outliers. There are no alarming shifts in the 1983 tax rate data illustrated in Figure 4. However, the generally higher trimmed average tax rates indicate the presence of negative outliers.

Figures 5 through 10 illustrate the relative rankings of the untrimmed tax rates (from the univariate statistics) and the trimmed tax rates (a filter of +/- two hundred percent) by year for each of the six tax rate definitions. One might hypothesize tax rate decreases from 1980 to 1981 and from 1981 to 1982, but then increases in 1983 based on the following logic: The 1980 through 1982 trend would be consistent with a notion that tax rates would decrease after the enactment of the Economic Recovery Tax Act of 1981 due to liberalized depreciation and investment credit provisions. An increase from 1982 to 1983 would relate to provisions of the Tax Equity and Fiscal Responsibility Act of 1982 which restrict the tax benefits of leasing depreciable assets, most notably equipment. This hypothesis is formalized as follows:

H_0: ETRs will not vary between 1980 and 1983 by year.

H_a: ETRs will decrease from 1980 to 1981, further decrease from 1981 to 1982, and then increase from 1982 to 1983.

In Figure 5, both the trimmed and untrimmed tax rates computed according to the Tax Notes definition show similar patterns which are also consistent with the tax rate behavior hypothesized above.

In Figure 6, the trimmed tax rates computed according to the Congressman Vanik definition show similar behavior to the Tax Notes rates in Figure 5. The presence of outliers in the untrimmed data may explain the inconsistent behavior of the untrimmed rates. The same explanation also applies to the trimmed and untrimmed rates computed according to the Congressmen Dorgan and Pease definition in Figure 7.

In Figure 8, both the untrimmed and trimmed rates computed according to Stickney and McGee definition follow the trend hypothesized for the Tax Notes rates. It should be noted, however, that the negative tax rate for the untrimmed 1982 data is due to extreme negative outliers.

In Figure 9, tax rates computed according to Zimmerman's ideal definition first increase from 1980 to 1981 and then decrease in both 1982 and 1983. This behavior is inconsistent with the hypothesized trend. This inconsistency may be related to the denominator of this tax rate definition, which is operating cash flow, which would not capture the increase in depreciation due to asset acquisitions spurred by the Economic Recovery Tax Act of 1981.

In Figure 10, tax rates computed according to Zimmerman's actual definition increase from 1980 to 1981, decrease in 1982, and then increase in 1983. This tax rate behavior is not consistent with the hypothesized trend. This inconsistency is likely to be related to the denominator of this tax rate definition, gross profit, which would not capture the increase in depreciation due to asset acquisitions spurred by the Economic Recovery Tax Act of 1981.

In summary, tax rates exhibited behavior in accordance with a predicted trend across several tax rate definitions, lending a healthy degree of robustness to this hypothesis. The two exceptions to this trend were tax rate definitions whose denominators exclude traditional elements such as depreciation.

Basic Regression Results

Results by Year

In 1980, the sample size of the regressions varied from 416 to 484, with the reduction in sample size from the ideal 527 arising from either a filter on the dependent tax rate variable (plus or minus two hundred percent) or missing COMPUSTAT data. The natural resource involvement variable had the hypothesized sign (-) 5 out of 6 times, but was not significant in any of the six regressions. The minimal amount of natural resource involvement noted in the univariate statistics in Table 1 could be related to this result. The foreign involvement variable had the hypothesized sign (+) and was significant in all six

regressions, showing a robust result across multiple definitions. The capital intensity variable had the hypothesized sign (-) in all six regressions and was significant in four out of these six regressions, indicating a somewhat robust result with respect to this hypothesis across tax rate definitions. The size variable had the hypothesized sign (-) in all six regressions and was significant in four out of these six regressions, indicating a somewhat robust result with respect to this hypothesis across alternate definitions. The leverage variable had the hypothesized sign (-) in all six regressions, but was barely significant in two out of these six regressions. This lack of significance might be viewed as tentative support for Bernard's (1984) notion that interest expense (and by association leverage) should not affect the level of an effective tax rate. The income level variable had the hypothesized sign (+) in four out of six regressions, and was significant in three of the regressions (all with the hypothesized sign) lending weak support to Wilkie's (1988) analytic finding that level of income and tax rate level share a positive relationship. The export involvement variable had the hypothesized sign (-) in five out of six regressions and was significant in three of those regressions (all with the hypothesized sign), lending moderate support to this hypothesis across definitions. The results of these regressions are presented in Table 7.

In 1981, the sample size of the regressions varied from 412 to 488, with the reduction in sample size from the ideal 527

TABLE 7
REGRESSION RESULTS FOR YEAR 1980 FOR 6 EFFECTIVE TAX RATE DEFINITIONS

DEPENDENT VARIABLE: TAX RATE DEFINITION (NUMBER OF OBSERVATIONS)	INDEPENDENT VARIABLE COEFFICIENTS (PREDICTED SIGN) NSPROP80(-)	FSPROP80(+)	CPINTA80(-)	ASTLN80(-)	DBTSE80(-)	INCLVL80(+)	DISC80(-)	MODEL R2
TXNT80(484)	-0.016	0.194***	-0.095**	-0.046***	-0.014	0.026***	-0.018	.14
VANIK80(416)	0.014	0.268***	-0.054	-0.016	-0.025*	-0.005	-0.040*	.10
DORPEA80(416)	-0.004	0.227***	-0.059	-0.022**	-0.024*	0.002	-0.035	.11
STICKN80(431)	-0.056	0.256***	-0.117**	-0.009	-0.023	-0.011	-0.051*	.09
ZIMMER80(469)	-0.064	0.192*	-0.482***	-0.096***	-0.031	0.040***	-0.042	.26
ZIMMRA80(470)	-0.002	0.124**	-0.128***	-0.037***	-0.014	0.011**	0.003	.16

SIGNIFCANT PARAMETERS ARE INDICATED WITH ASTERISKS(*=.05,**=.01,***=.001)

KEY: NSPROP=NATURAL RESOURCE SALES/TOTAL SALES
FSPROP=FOREIGN SALES/TOTAL SALES
CPINTA=GROSS PLANT/TOTAL ASSETS
ASTLN=LOG(TOTAL ASSETS)
DBTSE=DEBT/STOCKHOLDERS' EQUITY
INCLVL=LOG(OPERATING INCOME)
DISC=DUMMY OF EXISTENCE OF DOMESTIC INTERNATIONAL SALES CORPORATION
TXNT= TAX NOTES DEFINITION
VANIK= CONGRESSMAN VANIK DEFINITION
DORPEA= CONGRESSMEN DORGAN AND PEASE DEFINITION
STICKN=STICKNEY AND MCGEE DEFINITION
ZIMMER=ZIMMERMAN(IDEAL DEFINITION)
ZIMMRA=ZIMMERMAN(ACTUAL DEFINITION)

arising from either a filter on the dependent tax rate variable (plus or minus two hundred percent) or missing COMPUSTAT data. The natural resource involvement variable had the hypothesized sign (-) three out of six times, but was not significant in any of the six regressions. Again, the minimal amount of natural resource involvement noted in the univariate statistics of Table 1, this is not really surprising. The foreign involvement variable had the hypothesized sign (+) for all six regressions and was significant four of the six regressions, showing a moderately robust hypothesized result across multiple definitions. The slight decrease in foreign involvement from 1980 to 1981 noted in the univariate statistics could be related to the shift in the robustness of results from 1980 to 1981. The capital intensity variable had the hypothesized sign (-) in all six regressions was significant in five out of these six regressions, indicated a fairly strong result with respect to this hypothesis across tax rate definitions. This result ties in with the expected impact of the liberalized depreciation and investment tax credit provisions of the Economic Recovery Tax Act of 1981. The size variable had the hypothesized sign (-) in all six regressions and was significant in five out of these six regressions, indicating a fairly strong result with respect to this hypothesis across alternate definitions. The leverage variable had the hypothesized sign (-) in five out of six regressions, but was marginally significant in two out of these six regressions (both with the hypothesized sign). Similar to 1980's results concerning

this variable, this lack of significance could be viewed as tentative support for Bernard's (1984) notion that interest expense (and by association leverage) should not affect the level of an effective tax rate. The income level variable had the hypothesized sign (+) in all six regressions, and was significant in five of the regressions (all with the hypothesized sign) lending fairly strong support to Wilkie's (1988) analytic finding that level of income and tax rate level share a positive relationship. This represents a stronger result than that obtained in 1980. The export involvement variable had the hypothesized sign (-) in four out of six regressions and was significant in two of those regressions (all with the hypothesized sign, lending weak support to this hypothesis across definitions. The results of these regressions are presented in Table Eight.

In 1982, the sample size of the regressions varied from 406 to 488, with the reduction in sample size from the ideal 527 arising from either a filter on the dependent tax rate variable (plus or minus two hundred percent) or missing COMPUSTAT data. The natural resource involvement variable had the hypothesized sign (-) three out of six times and was significant in only one (with hypothesized sign) of the six regressions. Again, based on the minimal amount of natural resource involvement noted in the univariate statistics, this is not really surprising. The foreign involvement variable had the hypothesized sign for five of the six regressions and was significant for three of the six regressions (all in the hypothesized direction), showing

TABLE 8
REGRESSION RESULTS FOR YEAR 1981 FOR 6 EFFECTIVE TAX RATE DEFINITIONS

DEPENDENT VARIABLE: TAX RATE DEFINITION (NUMBER OF OBSERVATIONS)	INDEPENDENT VARIABLE COEFFICIENTS (PREDICTED SIGN)---------- NSPROP81(-)	FSPROP81(+)	CPINTA81(-)	ASTLN81(-)	DBTSE81(-)	INCLVL81(+)	DISC81(-)	MODEL R2
TXNT81(488)	.017	.193***	-.141***	-.054***	.001	.031***	-.061**	.14
VANIK81(412)	-.051	.211**	-.090*	-.037***	-.009	.025***	.002	.09
DORPEA81(412)	-.057	.196**	-.088*	-.039***	-.009	.025***	.004	.09
STICKN81(417)	.017	.106	-.294***	-.024	-.076*	.014	-.025	.13
ZIMMER81(471)	.001	.158*	-.372***	-.083***	-.011	.063***	-.089***	.27
ZIMMRA81(473)	-.005	.033	-.016	-.022***	-.015*	.018***	-.015	.14

SIGNIFCANT PARAMETERS ARE INDICATED WITH ASTERISKS(*=.05,**=.01,***=.001)

KEY: NSPROP=NATURAL RESOURCE SALES/TOTAL SALES
FSPROP=FOREIGN SALES/TOTAL SALES
CPINTA=GROSS PLANT/TOTAL ASSETS
ASTLN=LOG(TOTAL ASSETS)
DBTSE=DEBT/STOCKHOLDERS' EQUITY
INCLVL=LOG(OPERATING INCOME)
DISC=DUMMY OF EXISTENCE OF DOMESTIC INTERNATIONAL SALES CORPORATION
TXNT= TAX NOTES DEFINITION
VANIK= CONGRESSMAN VANIK DEFINITION
DORPEA= CONGRESSMEN DORGAN AND PEASE DEFINITION
STICKN=STICKNEY AND MCGEE DEFINITION
ZIMMER=ZIMMERMAN(IDEAL DEFINITION)
ZIMMRA=ZIMMERMAN(ACTUAL DEFINITION)

moderate support for the hypothesized result across multiple definitions. The slight decrease in foreign involvement from 1981 to 1982 noted in the univariate statistics could be related to the shift in the robustness of results from 1981 to 1982. The capital intensity variable had the hypothesized sign (-) in all six regressions was significant in five out of these six regressions, indicated a fairly strong result with respect to this hypothesis across tax rate definitions. This result ties in with the continued impact of the liberalized depreciation and investment tax credit provisions of the Economic Recovery Tax Act of 1981. The size variable had the hypothesized sign (-) in all six regressions and was significant in three out of these six regressions, indicating moderate support for this hypothesis across alternate definitions. The leverage variable had the hypothesized sign (-) in all six regressions, but was significant in just two out of these six regressions. Similar to 1980 and 1981 results concerning this variable, this general lack of significance could be viewed as tenuous support for Bernard's (1984) notion that interest expense (and by association leverage) should not affect the level of an effective tax rate. The income level variable had the hypothesized sign (+) in five of the six regressions, and was significant in three of the regressions (all with the hypothesized sign) lending moderate support to Wilkie's (1988) analytic finding that level of income and tax rate level share a positive relationship. This represents a weaker result than that obtained in 1981. The export involvement variable had the hypothesized

sign (-) in all six regressions and was significant in four of those regressions (all with the hypothesized sign) lending somewhat strong support to this hypothesis across definitions. The results of these regressions are presented in Table 9.

In 1983, the sample size of the regressions varied from 412 to 488 with the reduction in sample size from the ideal 527 arising from either a filter on the dependent tax rate variable (plus or minus two hundred percent) or missing COMPUSTAT data. The natural resource involvement variable had the hypothesized sign (-) five out of six times and was significant in three (one without hypothesized sign) of the six regressions. Given, the relative stability of the univariate statistics for this variable, this result is somewhat puzzling and is perhaps sample specific. The foreign involvement variable had the hypothesized sign (-) for all six regressions and was significant for three of the six regressions (all in the hypothesized direction), showing moderate support for the hypothesized result across multiple definitions. The slight decrease in foreign involvement from 1981 to 1982 noted in the univariate statistics could be related to the slight shift in significance from 1982 to 1983. The capital intensity variable had the hypothesized sign(-) in all six regressions and was significant in four out of these six regressions, indicating somewhat strong support for this hypothesis across tax rate definitions. This slightly less robust result compared to 1982 could relate to the restrictions on the tax benefits of equipment leasing enacted in the Tax Equity and

TABLE 9
REGRESSION RESULTS FOR YEAR 1982 FOR 6 EFFECTIVE TAX RATE DEFINITIONS

DEPENDENT VARIABLE: TAX RATE DEFINITION (NUMBER OF OBSERVATIONS)	INDEPENDENT VARIABLE COEFFICIENTS (PREDICTED SIGN) NSPROP82(-)	FSPROP82(+)	CPINTA82(-)	ASTLN82(-)	DBTSE82(-)	INCLVL82(+)	DISC82(-)	MODEL R2
TXNT82(488)	-.214*	.242**	-.224***	-.032**	-.027	.021***	-.065	.16
VANIK82(405)	.135	.248**	-.136**	-.014	-.026	.007	-.054	.07
DORPEA82(406)	.045	.228**	-.125*	-.013	-.026	.006	-.057*	.07
STICKN82(406)	-.280	.235	-.143	-.023	-.043	-.010	-.126**	.07
ZIMMER82(474)	.014	-.130	-.483***	-.028*	-.070***	.040***	-.131***	.35
ZIMMRA82(475)	-.040	.040	-.066***	-.017***	-.012*	.018***	-.026*	.25

SIGNIFCANT PARAMETERS ARE INDICATED WITH ASTERISKS(*=.05,**=.01,***=.001)

KEY: NSPROP=NATURAL RESOURCE SALES/TOTAL SALES
FSPROP=FOREIGN SALES/TOTAL SALES
CPINTA=GROSS PLANT/TOTAL ASSETS
ASTLN=LOG(TOTAL ASSETS)
DBTSE=DEBT/STOCKHOLDERS' EQUITY
INCLVL=LOG(OPERATING INCOME)
DISC=DUMMY OF EXISTENCE OF DOMESTIC INTERNATIONAL SALES CORPORATION
TXNT= TAX NOTES DEFINITION
VANIK= CONGRESSMAN VANIK DEFINITION
DORPEA= CONGRESSMEN DORGAN AND PEASE DEFINITION
STICKN=STICKNEY AND MCGEE DEFINITION
ZIMMER=ZIMMERMAN(IDEAL DEFINITION)
ZIMMRA=ZIMMERMAN(ACTUAL DEFINITION)

Fiscal Responsibility Act of 1982. The size variable had the hypothesized sign (-) in all six regressions and was significant in three out of these six regressions, indicating moderate support for this hypothesis across alternate definitions. The leverage variable had the hypothesized sign (-) in all six regressions, but was not significant in any of these six regressions. This total lack of significance could be viewed as reasonably strong support for Bernard's (1984) notion that interest expense (and by association leverage) should not affect the level of an effective tax rate. The income level variable had the hypothesized sign (+) in five of the six regressions, and was significant in five of the regressions (all with the hypothesized sign) lending strong support to Wilkie's (1988) analytic finding that level of income and tax rate level share a positive relationship. The export involvement variable had the hypothesized sign (-) in four of the six regressions and was significant in two of those regressions (both with the hypothesized sign) lending somewhat weak support to this hypothesis across definitions. The results of these regressions are presented in Table 10.

Results by Variable

Overall, the results for natural resource involvement variable were unimpressive, with only four significant parameters out of twenty four possible (six definitions over four years). One of these significant parameters has a sign contrary to the hypothesized sign. The relative small sales amount which relates

TABLE 10
REGRESSION RESULTS FOR YEAR 1983 FOR 6 EFFECTIVE TAX RATE DEFINITIONS

DEPENDENT VARIABLE: TAX RATE MODEL DEFINITION (NUMBER OF OBSERVATIONS)	INDEPENDENT VARIABLE COEFFICIENTS (PREDICTED SIGN)---------- NSPROP83(-)	FSPROP83(+)	CPINTA83(-)	ASTLN83(-)	DBTSE83(-)	INCLVL83(+)	DISC83(-)	R2
TXNT83(488)	-.168*	.129	-.135**	-.025**	-.025	.022***	-.069**	.15
VANIK83(412)	-.177	.247**	-.070	-.020	-.033	.024**	.001	.08
DORPEA83(412)	-.069	.187*	-.122*	-.019	-.036	.023**	.011	.08
STICKN83(417)	-.438***	.240*	-.182*	-.000	-.021	-.009	-.041	.10
ZIMMER83(471)	-.079	.067	-.259***	-.054***	-.045	.039***	-.091**	.23
ZIMMRA83(473)	.155**	.082	-.042	-.020**	-.016	.008**	-.020	.06

SIGNIFCANT PARAMETERS ARE INDICATED WITH ASTERISKS(*=.05,**=.01,***=.001)

KEY: NSPROP=NATURAL RESOURCE SALES/TOTAL SALES
FSPROP=FOREIGN SALES/TOTAL SALES
CPINTA=GROSS PLANT/TOTAL ASSETS
ASTLN=LOG(TOTAL ASSETS)
DBTSE=DEBT/STOCKHOLDERS' EQUITY
INCLVL=LOG(OPERATING INCOME)
DISC=DUMMY OF EXISTENCE OF DOMESTIC INTERNATIONAL SALES CORPORATION
TXNT= TAX NOTES DEFINITION
VANIK= CONGRESSMAN VANIK DEFINITION
DORPEA= CONGRESSMEN DORGAN AND PEASE DEFINITION
STICKN=STICKNEY AND MCGEE DEFINITION
ZIMMER=ZIMMERMAN(IDEAL DEFINITION)
ZIMMRA=ZIMMERMAN(ACTUAL DEFINITION)

to natural resource activity over the sample (per the univariate statistics in Table 1) makes this result no surprise.

The overall results for the foreign involvement variable were somewhat impressive, with sixteen significant parameters out of twenty four possible (six definitions over four years). None of these significant parameters had a sign contrary to the hypothesized sign. The decreased robustness of this variable after 1980 is monotonically related to the gradual decrease in the foreign involvement variable documented in Table 1's univariate statistics.

The overall results for the capital intensity variable were quite robust, with eighteen significant parameters out of twenty four possible (six definitions over four years). None of these significant parameters had a sign contrary to the hypothesized sign. On average, the capital intensity variable increased from 1980 to 1981 and from 1981 to 1982, with a slight decrease in 1983 (per Table 1 statistics). This trend is a consistent corollary with the tax rate trend hypothesized above (capital intensity increased and decreased when tax rates decreased and increased respectively.

Overall, the results for the size variable were moderately impressive, with fifteen significant parameters out of twenty four possible (six definitions over four years). None of these significant parameters had a sign contrary to the hypothesized sign. The average size variable increased monotonically throughout the years considered (1980 - 1983). The most

interesting result for this variable was the significant negative result for both Zimmerman tax rate definitions for all years analyzed, given that the political cost hypothesis holds that size and effective tax rate are positively related. This represents a partial rebuff of the positive accounting theory popularized in the Journal of Accounting and Economics. The inclusion of other variables (than size) in this analysis strengthen this result by allaying ceteris paribus concerns regarding other firm characteristics.

The overall results for the leverage variable were unimpressive, with only six significant parameters out of twenty four possible (six definitions over four years). None of these significant parameters had a sign contrary to the hypothesized sign. On average, the leverage variable decreased from 1980 to 1981 , increased from 1981 to 1982, with a large decrease in 1983 (per Table 1 statistics). The weak result on leverage lends some credence to Bernard's (1984) complaint about the a lack of impact of interest expense on tax rate level.

Overall, the results for the level of income variable were moderately impressive, with sixteen significant parameters out of twenty four possible (six definitions over four years). None of these significant parameters had a sign contrary to the hypothesized sign. The average income level variable increased from 1980 to 1981, decreased in 1982, and then increased in 1983. Apparently when income increases, then there may be a lag in acquiring "tax shields" against an increase in tax. This

statement is based on the increased significance of the level of income variable in 1981 compared to 1980 and 1983 compared to 1982 (income increased over both these ranges).

The overall results for the export involvement variable were somewhat weak, with ten significant parameters out of twenty four possible (six definitions over four years). None of these significant parameters had a sign contrary to the hypothesized sign. Apparently the use of Domestic International Sales Corporations played a modest role in lowering the tax rates of the firms sampled.

Four Year Average Results with NOL variable

In order to accommodate the concept that net operating loss frequency is a moderating variable in the relationship between firm size and effective tax rate, as discussed in Wang (1991), regressions will be performed which include variables averaged over the four year period (1980 to 1983) of the current study with the addition of an NOL frequency variable (defined by the presence of unused NOL carryforward). These results are presented in Table 11. In none of the six regressions (one per tax rate definition) did the NOL frequency variable come up significant. This may be an indication that Wang's (1991) analysis suffers from the same missing variable problem which Wang (1991) attributes to Zimmerman (1983). The results of these regressions are presented in Table 11. The details of these regression results are described below.

TABLE 11
REGRESSION RESULTS FOR FOUR YEAR AVERAGE OF EACH OF 6 EFFECTIVE TAX RATE DEFINITIONS

DEPENDENT VARIABLE: TAX RATE DEFINITION (NUMBER OF OBSERVATIONS)	INDEPENDENT VARIABLE COEFFICIENTS(PREDICTED SIGN) NSPROP (-)	FSPROP(+)	CPINTA(-)	ASTLN(-)	DBTSE(-)	INCLVL(+)	DISC(-)	NOL(-)	MODEL R2
TXNT(481)	-.024	.228***	-.123***	-.036***	-.015	.010*	-.039**	-.039	.23
VANIK(390)	-.057	.291***	.039	-.071***	-.032*	.039***	-.004	.001	.17
DORPEA(390)	-.063	.281***	.040	-.070***	-.032*	.038***	-.007	-.004	.17
STICKN(395)	-.400	.044	-.145	.041	-.025	-.048	.066	-.141	.02
ZIMMER(465)	-.017	.176**	-.309***	-.073***	-.062***	.039***	-.073***	-.038	.34
ZIMMRA(467)	.011	.103**	-.030	-.028***	-.012	.015***	-.005	-.028	.10

SIGNIFCANT PARAMETERS ARE INDICATED WITH ASTERISKS(*=.05,**=.01,***=.001)

KEY: NSPROP=NATURAL RESOURCE SALES/TOTAL SALES
FSPROP=FOREIGN SALES/TOTAL SALES
CPINTA=GROSS PLANT/TOTAL ASSETS
ASTLN=LOG(TOTAL ASSETS)
DBTSE=DEBT/STOCKHOLDERS' EQUITY
INCLVL=LOG(OPERATING INCOME)
DISC=DUMMY OF EXISTENCE OF DOMESTIC INTERNATIONAL SALES CORPORATION
NOL=NET OPERATING LOSS FREQUENCY IN 1980 THROUGH 1983 PERIOD
TXNT= TAX NOTES DEFINITION
VANIK= CONGRESSMAN VANIK DEFINITION
DORPEA= CONGRESSMEN DORGAN AND PEASE DEFINITION
STICKN=STICKNEY AND MCGEE DEFINITION
ZIMMER=ZIMMERMAN(IDEAL DEFINITION)
ZIMMRA=ZIMMERMAN(ACTUAL DEFINITION)

The average natural resource involvement variable had the hypothesized sign (-) five out of six times but was not significant for any of the six regressions. Given the low level of this variable throughout the univariate statistics for the independent variables, this result is not surprising. The average foreign involvement variable had the hypothesized sign (-) for all six regressions and was highly significant for five of the six regressions , showing strong support for the hypothesized result across multiple definitions.

The average capital intensity variable had the hypothesized sign (-) in four of the six regressions and was significant in two out of these six regressions, indicating weak support for this hypothesis across tax rate definitions. Considering the statutory scheme for depreciation prior to the Economic Recovery Tax Act of 1981 and the restrictions on the tax benefits of equipment leasing after the Tax Equity and Fiscal Responsibility Act of 1982, then this weak overall result is not surprising.

The average size variable had the hypothesized sign (-) in five out of six regressions and was significant in the same five regressions, indicating quite strong for this hypothesis across alternate definitions. The average leverage variable had the hypothesized sign (-) in all six regressions and was significant in three of these six regressions.

The average income level variable had the hypothesized sign (+) in five of the six regressions, and was significant in the same

five regressions, lending strong support to Wilkie's (1988) analytic finding that level of income and tax rate level share a positive relationship. The average export involvement variable had the hypothesized sign(-) in five of the six regressions and was significant in two of those regressions (both with the hypothesized sign) lending somewhat weak support to this hypothesis across definitions. The net operating loss frequency variable had the predicted sign (-) in five out of the six regressions but was not significant in any of them.

Results based on Change from 1980 to 1983

Regression were performed based on the change in the six dependent variable tax rates and all the basic seven independent variables (except export involvement which was coded the same for all years). Only the income level variable was consistently significant. Given the upward trend of tax rates after 1982 and the downward trend after 1980, this lack of significance is hardly surprising. No tabular presentation of these results is made.

Formal Comparison Between Regressions

Multivariate regressions (multiple independent and dependent variables) allow formal comparison between regression models. The multivariate analyses made in this study consist of pair-wise multivariate comparisons (fifteen among six regressions by tax rate definition) of non-intercept parameters aggregated by

regression. In general, the null hypothesis that these parameters are the same was rejected. Three of the fifteen comparison were not significant in 1980, while two were not significant in 1981. In 1982, only one of fifteen contrasts was not significant, while six were not significant in 1983. The results of this multivariate analysis are presented in Table 12. These results indicate that corporate attributes have varying influences on the level of the ETR, depending on the ETR definition.

TABLE 12
FORMAL PAIR WISE COMPARISON OF NON-INTERCEPT REGRESSION
PARAMETERS BY TAX RATE DEFINITION FOR EACH OF FOUR YEARS(1980-1983)

	ZIMMER	ZIMMRA	TXNT	STICKN	VANIK	DORPEA
ZIMMER	NA					
ZIMMRA	0123	NA				
TXNT	0123	0123	NA			
STICKN	0123	0123	0123	NA		
VANIK	0123	012N	0N2N	N123	NA	
DORPEA	0123	012N	NN2N	N12N	01NN	NA

KEY:
TXNT= TAX NOTES DEFINITION
VANIK= CONGRESSMAN VANIK DEFINITION
DORPEA= CONGRESSMEN DORGAN AND PEASE DEFINITION
STICKN=STICKNEY AND MCGEE DEFINITION
ZIMMER=ZIMMERMAN(IDEAL DEFINITION)
ZIMMRA=ZIMMERMAN(ACTUAL DEFINITION)
NA=NOT APPLICABLE
0= WILKS' LAMBDA, PILLAI'S TRACE, HOTELLING-LAWLEY TRACE, AND ROY'S GREATEST ROOT ALL SIGNIFICANT FOR 1980
1= WILKS' LAMBDA, PILLAI'S TRACE, HOTELLING-LAWLEY TRACE, AND ROY'S GREATEST ROOT ALL SIGNIFICANT FOR 1981
2= WILKS' LAMBDA, PILLAI'S TRACE, HOTELLING-LAWLEY TRACE, AND ROY'S GREATEST ROOT ALL SIGNIFICANT FOR 1982
3= WILKS' LAMBDA, PILLAI'S TRACE, HOTELLING-LAWLEY TRACE, AND ROY'S GREATEST ROOT ALL SIGNIFICANT FOR 1983.
N= WILKS' LAMBDA, PILLAI'S TRACE, HOTELLING-LAWLEY TRACE, AND ROY'S GREATEST ROOT NOT SIGNIFICANT

CHAPTER VIII

CONCLUSIONS

Implications of Results

It appears that the Congressional purpose of rewarding those who acquire capital goods was fulfilled through the enactment of liberal depreciation and investment provisions in 1981. It also appears that Congress was successful in blunting over-consumption of these liberal provisions through restrictions on safe harbor leasing in 1982 legislation.

The empirical dilemma of identifying the relationship between size and tax rate level is at least partially resolved by this study. This study identified this relationship as negative across several tax rate definitions over a multi-year period. Since Congress sometimes acts to correct perceived inequities, this finding (larger companies pay less tax, proportionately) could have important political implications.

Companies with foreign involvement were found to face higher tax burdens than those concentrating on the domestic economy. This suggests that U.S. foreign policy makers should pursue reductions in these burdens in order to enhance the competitiveness of U.S. firms overseas. Export incentives made little difference in tax burdens, suggesting that non-tax incentives might be a more appropriate way to spur exports.

Variations in capital structure (debt versus equity) did not appear to have much of an effect on the tax burden of corporations. This finding may have an implication for possible

legislation curbing interest deductions in the wake of financial ruin created by leveraged buyouts. While limited by the sample period, the findings regarding capital structure suggest that such legislation would have little effect on corporate tax burdens.

It appears that corporations suffer from a one year lag in applying tax reducing strategies in the face of increases in the level of income. This suggests that tax increasing legislation will boost revenues, at least on a short-term basis.

Potential for Future Research

For purposes of testing the hypotheses considered during the period tested, the Tax Notes tax rate definition produced the most consistent results. Perhaps the careful consideration of timing differences in the computation of this rate are responsible for this consistency. Given the hypothesis and time period limitations, the Tax Notes definition should be used in future research on effective tax rates.

It would perhaps be best to consider the Tax Notes definition in conjunction with other tax rate definitions, given the suggestions of Omer, Molloy, and Ziebart (1991) belied by the less than totally robust findings of this study across several tax rate definitions. Given the high correlation between the Vanik and Dorgan and Pease definitions of ETR, one of these could be eliminated from future consideration.

While this study covers a time period spanning the most significant tax legislation for corporations in history, there is

potential for considering the effect of subsequent legislation, most notably the Tax Reform Act of 1986. Testing the current hypotheses in a different time period would certainly add value to the stream of accounting research on ETRs.

Given the level of predictive ability of the models estimated in this study, there is great potential for identifying other influences on the ETRs of corporations. In fact, the aggregate influence of the corporate attributes considered in this study is rather modest based on the predictive ability of the regression models estimated in this study. It appears than tax preferences have a less than compelling influence on the level of effective corporate income tax rates.

In summary, there appear to be a number of possibilities for extending the finding of the current study.

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