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STATES TAX STRUCTURE 1959-1972.

LEHIGH UNIVERSITY, PH.D., 1978

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INFLATION AND THE PROGRESSIVITY OF THE
UNITED STATES TAX STRUCTURE
1959-1972

by
Albert F. Fries, Jr.

A Dissertation
Presented to the Graduate Committee
of Lehigh University
in Candidacy for the Degree of
Doctor of Philosophy

in the
Department of Economics

Lehigh University
1978

Approved and recommended for acceptance as a
dissertation in partial fulfillment of the requirements
for the degree of Doctor of Philosophy.

April 14 1978
(date)

J. Richard Aronson
Professor in Charge

Accepted July 21 1978
(date)

Special committee directing
the doctoral work of
Albert E. Fries, Jr.

J. Richard Aronson
Chairman

Jon T. Innes

E. Schwartz

G. J. McAllister

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Abstract

The desirability of tax progressivity has been discussed and debated in the United States since the turn of the century. In February, 1913, the sixteenth amendment to the U. S. Constitution was ratified, thereby making possible the first successful attempt at progressive taxation in this country.

With a progressive income tax in place, at the federal level, the debate shifted from the desirability of progressive taxation to the degree of progressivity that was equitable, fair, or optimal. This line of argument has led to numerous attempts to measure the actual degree of effective tax progressivity and these efforts have continued to the present day.

Prior to 1975, the measurement of tax progressivity centered on the rate schedule, the exemptions, the deductions, and the effective rates paid - in short, the tax codes or tax legislation. However, in the early 1960's, through the efforts of many including Walter Heller, the interaction of economic growth with the tax codes was recognized and its importance dramatized as fiscal drag.¹

¹Walter Heller, New Dimensions of Political Economy, (Cambridge: Harvard University Press, 1966), p. 65.

The problem identified as fiscal drag comes about when an economy with a progressive tax experiences a sustained period of economic growth, causing tax revenues to grow faster than expenditures, thereby acting as a drag on economic growth. More recently, with persistent and high rates of price inflation, it has been recognized that a progressive tax interacts with another aspect of the economy - inflation - changing the effective, or altering the legislated, degree of tax progressivity. This interaction of a progressive tax and price inflation has now drawn the attention and concern of researchers as fiscal drag did in the early 1960's.

The work of D. T. Smith, H. Aaron, and G. M. von Furstenberg supports the argument that inflation alters tax progressivity but the direction of change is not clear.² Both Smith and Aaron concluded that inflation increased the progressivity of the federal individual income tax. Aaron also studied the impact of inflation on all major taxes and concluded that inflation

²Dan Throop Smith, "Progressive Income Taxation Discriminates Against Larger Incomes During Inflation," Tax Review 36 (June 1975): pp. 448-56; Henry J. Aaron, ed., Inflation and the Income Tax, (Washington, D.C.: The Brookings Institution, 1976), pp. 5-6; and George von Furstenberg, "Individual Income Taxation and Inflation," National Tax Journal 28 (March 1975): pp. 117-125.

increased the progressivity of the overall tax structure.³ However, von Furstenberg, after studying the effect of inflation on the federal individual income tax, concluded that inflation reduced its progressivity.⁴

Two questions emerge from this confusion: (1) What has actually happened to the progressivity of different taxes and the tax structure during this inflationary period? and (2) What role did inflation play in the changes that took place?

This dissertation addresses these two questions by examining the specific progressivity of ten major taxes and the progressivity of the overall tax structure during the period 1959-1972. The first task is to establish how the progressivity of the ten taxes and of the tax structure changed during the period and then to assess separately the role that economic growth, tax code changes, and inflation played in altering tax progressivity during the period. The results of this investigation will be used to evaluate the arguments for

³Aaron, Inflation and the Income Tax, (Washington, D.C.: The Brookings Institution, 1976), pp. 5-6.

⁴von Furstenberg, "Individual Income Taxation and Inflation," National Tax Journal 28 (March 1975): pp. 117-125.

tax reform including the various proposals for indexing some of the major taxes in the U. S. tax structure.

Chapter I

INTRODUCTION AND SUMMARY

During the 1950's and early 1960's price increases were held to a moderate rate. However, beginning in the late 1960's and continuing into the 1970's, the rate of increase accelerated. There is a broad consensus, supported by the work of D. T. Smith, H. Aaron, G. M. von Furstenberg, and others, that inflation has altered or changed the progressivity of several of the major taxes and of the tax structure, but the exact nature of the change is not clear.

D. T. Smith, in a 1975 study of the impact of inflation on the federal individual income tax, concluded that during an inflation, progressive taxation discriminates against larger incomes. This is so because "[t]he larger the income, the greater must be the increase in before-tax income to maintain the real value of net income."⁵

In support of this argument, Henry Aaron pointed out that inflation alters both the tax base and the rate structure, causing (1) "a taxpayer to pay a different amount of tax on the same real income than he would pay

⁵Dan Throop Smith, "Progressive Income Taxation Discriminates Against Larger Incomes During Inflation," Tax Review 36 (June 1975): p. 27.

in a non-inflationary world . . . [and (2) changing] the relative tax liabilities of tax payers who would be in different brackets in a non-inflationary world."⁶ He concluded that "inflation makes the over-all tax burden more progressive than Congress evidently intended."⁷

But there is certainly no consensus on the nature of the impact of inflation on tax progressivity. G. M. von Furstenberg examined the impact of inflation on the federal individual income tax and came to a different conclusion than Smith and Aaron. Von Furstenberg found that inflation caused a decline in the degree of progressivity as measured by both liability progression and average rate progression. The decline arises from the fact that the average tax rate during the period 1944-1975 rose by the smallest proportion on the highest incomes.⁸

The Task of this Research

The research to date on the effect of inflation on tax progressivity has produced contradictory results.

⁶Aaron, Inflation and the Income Tax, (Washington, D.C.: The Brookings Institution, 1976), p. 5-6.

⁷Ibid., p. 317.

⁸Von Furstenberg, p. 121.

This study will examine the degree of tax progressivity for the years 1959-1972 in an attempt to answer the question. The progressivity of ten separate taxes and the tax structure will be examined using a general measure, least squares logarithmic residual income progression (LSLRP), and an indirect measure, the changing Gini coefficient (CGC). These two measures of tax progressivity are summary or global measures and are usually supported with additional local measures such as the effective tax rate (the tax to base ratio) by income class and the distribution of income, before and after tax.

In addition to estimating actual tax progressivity for the 14 year period, 1959-1972, this paper contains three experiments which estimate what tax progressivity would have been during the period 1963-1972 if there had been no accelerated inflation or tax code changes. A comparison of these findings with the actual tax progressivity observed during the period will permit estimates of the relative impact of inflation and of tax code changes on the degree of tax progressivity between 1963 and 1972.

The tax burden by individual tax or the tax structure is defined as the tax payments divided by the tax base (income). Therefore, to assess the tax burden and

also to measure tax progressivity the tax base (income) must be defined and both the tax base (income) and the tax payments must be estimated. In order to conduct a formal incidence study, taxpayers must be grouped and then income received and tax paid by these groups must be estimated. In this study, taxpayers are grouped by income class. A brief discussion of the concepts and estimates of the tax base (income) and the tax payments by income class follows.

The income concept employed in this study is a most comprehensive one. It is based on the economic concept of income associated with Henry Simons; it includes all earned income (wages, interest, dividends, rent and royalties), capital gains (realized and unrealized), and transfer payments.⁹

In this study, net national product (NNP) as defined and published by the Department of Commerce is used as a proxy for the total gross household or family income. It is allocated to the income classes by using

⁹ Joseph Pechman and Benjamin Okner have developed a similar concept, total adjusted family income (AFI) for 1966 and 1970. Their AFI is an estimate of household income based on a broad Simon's type definition of income. The procedures they have developed and used to estimate AFI are too time consuming and complex to use in this research.

pro-rata income shares computed from IRS data.¹⁰

The total amount of tax revenue collected for the indirect taxes is taken from the National Income Accounts. The burden of these taxes is allocated to the income classes on the basis of expenditure series derived from the 1960-61 and the 1972-73 consumer expenditure surveys conducted by the Department of Labor and from Statistics of Income.¹¹ In the case of the federal individual income tax, the tax revenue from each income class is taken from Statistics of Income.

The incidence assumptions used in this study are similar to those of the 1974 Pechman and Okner study of the U. S. tax burden. Pechman and Okner used 1966 data and examined the progressivity of the tax structure under eight different sets of incidence assumptions. They found that the progressivity of individual taxes and the tax structure was not especially sensitive to the tax incidence assumptions employed. However, since the emphasis of the present study is not on the absolute

¹⁰U. S. Treasury Department, Internal Revenue Service, Statistics of Income, Individual Income Tax Returns, annual series, 1959-1972, (Washington, D.C.: The Brookings Institution, 1975).

¹¹See Chapter IV, Table 9, p. 88 of this study for the source of the allocator used.

level of progressivity, but on changes in progressivity over time, a set of incidence assumptions has been adopted that on the basis of the Pechman and Okner study, occupies the middle ground with respect to progressivity bias.

This study measures the progressivity of the tax system but does not measure the progressivity of government expenditures. This is not because the progressivity of government expenditures is considered unimportant, but because the allocation of benefits is subjective at best, in many cases impossible, even in principle. Moreover, a large proportion of expenditures is in the form of defense, research, health, education, environmental, and other categories whose benefits are common, thus making an independent examination of the tax system both practical and relevant.

The remainder of Chapter I summarizes the important findings of the present study. Chapter II examines the various methods that have been used to measure tax progressivity and treats several associated problems. Chapters III and IV set out the progressivity measures and tax incidence assumptions selected and also describe the data sources used. The results are presented in Chapters V and VI and the conclusions and implications of this study for tax reform in general and indexing in

particular are discussed in Chapter VII.

Summary of Results

The results are presented in two parts. The first reports actual tax progressivity prevailing during the period 1959-1972, and the second reports the role of inflation and the changing tax code on the changing tax progressivity described in Part I.

The most significant finding of this research is that the progressivity of the U. S. tax structure declined over the period 1959-1972. Table 1 shows the changing Gini coefficients (CGCs) and the effective tax rates by income class for selected years for the tax structure. The CGCs are negative for progressive taxes (the more negative the more progressive), and positive for regressive taxes (the more positive the more regressive).

It can be seen from the CGCs that the redistributive effect of the tax structure has declined during the period. The data on changes in effective rates support the findings of the CGCs. They increased on the low incomes and decreased on the high incomes over the time period, 1959-1972.

The declining progressivity of the U. S. tax structure is the result of the declining progressivity of the federal individual income tax, and the federal/state

TABLE 1

THE CHANGING GINI COEFFICIENTS (CGC) AND
EFFECTIVE TAX RATES BY INCOME CLASS
ALL TAXES, SELECTED YEARS

	1959	1965	1972
CGCs*	-1.90	-.68	1.47
Effective Rates	26.57	25.73	29.35
Income Classes	Effective Rates		
under 3,000	29.5	31.3	39.4
3,000-4,000	24.8	26.5	32.7
4,000-5,000	24.7	25.8	31.3
5,000-6,000	23.4	24.5	31.6
6,000-7,000	22.8	23.1	31.5
7,000-8,000	22.4	22.4	31.8
8,000-10,000	22.1	21.4	30.0
10,000-15,000	22.5	20.6	26.8
15,000-25,000	27.8	26.4	24.0
25,000 up	50.1	45.4	37.1

*The CGC measures the percent change between the before tax Gini coefficient and the after tax Gini coefficient. A negative CGC indicates a progressive tax (the more negative, the more progressive); a positive CGC indicates a regressive tax (the more positive, the more regressive); and a CGC of zero indicates a proportional tax. See Chapter II, pp. 52-59.

corporate income taxes, and the increasing regressivity of the payroll taxes.¹² Table 2 presents the CGCs and effective rates for the federal individual income tax, the federal/state corporate income taxes, and the payroll taxes for selected years. It is apparent that for these taxes progressivity declined sharply during the period 1959-1972.

The sales and excise taxes and the property taxes were proportional or nearly proportional throughout the period and did not contribute in any significant way to the changing progressivity of the tax structure between 1959 and 1972.

Another aspect of this research involved estimating the role of economic growth, tax code changes, and inflation on the changing progressivity of the tax structure during the period. Table 3 summarizes the results

¹²In this study, payroll deductions were treated as taxes. A persuasive argument can be made for considering at least some portion of these deductions as insurance premiums. If some or all of these regressive deductions were removed from the tax category the progressivity of the tax structure would be increased. Treating all these deductions as taxes was justified by the absence of a strict actuarial basis for the taxes and benefits and because of prevailing convention. For a discussion of payroll deductions as insurance premiums, see Rufus S. Tucker, "Distribution of Tax Burdens in 1948," National Tax Journal 4 (September 1951), p. 276; Eli Schwartz, "Studies in the Distribution of Tax Burdens by Income Group--A Critique" (Ph.D. Dissertation, Brown University, 1952), p. 88 ff.

TABLE 2

THE CHANGING GINI COEFFICIENTS AND
EFFECTIVE TAX RATES FOR
SELECTED TAXES
SELECTED YEARS

Years	Federal Individual Income Tax		Fed/St. Corporate Income Tax		Payroll Taxes				
	1959	1965	1972	1959	1965	1972	1959	1965	1972
CGCs	-4.04	-3.59	-3.81	-2.34	-2.83	-1.73	2.68	2.69	3.76
Effective Rates	8.75	7.92	8.85	3.99	3.79	2.99	5.25	4.75	6.92
Income Classes	Effective Rates		Effective Rates		Effective Rates		Effective Rates		
under 3,000	3.7	2.5	.6	2.1	2.0	1.9	7.6	7.7	11.8
3,000-4,000	5.6	4.5	2.7	1.4	1.9	2.6	8.1	8.4	11.3
4,000-5,000	6.3	5.1	4.0	1.0	1.5	1.9	8.3	8.7	11.7
5,000-6,000	6.8	5.6	5.0	.9	1.3	1.9	7.4	7.8	12.1
6,000-7,000	7.4	5.9	5.7	1.0	1.1	1.4	6.3	6.7	12.2
7,000-8,000	8.0	6.3	6.3	1.2	1.2	1.4	5.4	5.9	12.7
8,000-10,000	8.8	6.9	6.8	1.5	1.1	1.2	4.4	4.9	11.0
10,000-15,000	9.8	7.8	7.6	3.1	1.7	1.1	2.8	3.2	8.0
15,000-25,000	11.9	11.1	8.9	8.5	6.6	1.6	1.2	1.6	4.5
25,000 up	20.9	18.5	16.8	23.0	19.8	10.3	.3	.4	1.5

TABLE 3
 ESTIMATED CHANGING GINI COEFFICIENTS (CGCs)
 FROM THREE EXPERIMENTS WITH
 ACTUAL CGCs, ALL YEARS

	(1)	(2)	(3)	(4)
Year	Period Stable Growth	Actual Inflation No Tax Code Changes	No Inflation Actual Tax Code Changes	Actual
1959	-1.90	-1.90	-1.90	-1.90
1960	-1.56	-1.56	-1.56	-1.56
1961	-1.57	-1.57	-1.57	-1.57
1962	- .76	- .76	- .76	- .76
1963	- .46	- .65	- .27	- .45
1964	- .04	- .37	- .39	- .73
1965	.18	- .32	- .11	- .68
1966	.52	- .10	- .67	-1.31
1967	.78	- .35	.63	- .39
1968	.82	- .92	.64	- .76
1969	1.23	- .86	1.64	- .01
1970	1.67	- .93	3.14	1.46
1971	1.96	-1.14	3.55	1.53
1972	2.27	-1.46	3.86	1.47

of three experiments conducted to isolate these effects and presents for comparison the actual progressivity of the tax structure during the period. Column 1 of Table 3 reveals that economic growth alone, unaccompanied by double digit inflation and tax code changes, still would have reduced tax progressivity.

A comparison of the results of how tax progressivity would have changed in the absence of accelerated price inflation and tax code changes (column 1) with how tax progressivity actually changed during the period (column 4) reveals that tax progressivity would have declined more in the absence of accelerated price inflation and tax code changes than it actually did during the period. This suggests that the net effect of the factors other than those of economic growth was to increase tax progressivity between 1963 and 1972.

Two more experiments were conducted in an effort to determine the effect of two factors - tax code changes and accelerated price inflation - on this changing tax progressivity.

The results of the experiment conducted to estimate how the progressivity would have changed if the actual rate of inflation had been experienced without any accompanying changes in the tax codes are presented in column 2 of Table 3. It can be seen that tax progressivity

would have been greater during each year of the period with accelerated price inflation and no tax code changes than it would have been in the absence of accelerated inflation, but still would have declined.

Column 3 of Table 3 presents the results of a third experiment. This experiment reveals that the effect of the actual tax code changes, in the absence of accelerated price inflation, was to make the tax structure more progressive during the years 1964-1968 and less progressive during the later years, 1969-1972.

It can be inferred from these experiments that:

(1) there were aspects of the economy between 1963 and 1972 that worked to reduce tax progressivity including an increasing inequality in the pre-tax distribution of income and a decline in the proportion of tax revenue from the progressive taxes, (2) the accelerated price inflation experienced in the late 1960's and early 1970's served to counter these forces, and (3) the tax code changes during the period had a mixed effect on tax progressivity, increasing it at first but then, during the later years, decreasing it.

The effect that price inflation had is clear; it served throughout the period either to increase tax progressivity or to retard the decrease in progressivity that otherwise took place. The tax code changes, on the

other hand, while acting in a progressive manner between 1964 and 1968, served to decrease the degree of progressivity between 1969 and 1972. The combined effect of all factors caused the progressivity of the tax structure to decline steadily over the ten year period between 1963 and 1972, to become regressive in 1970, and remain so through 1972.

Between 1963 and 1968, both price inflation and the tax code changes retarded the decline in our tax progressivity. However, by 1969 the tax code changes and price inflation began to work in opposite directions. Price inflation continued to retard the decline in tax progressivity but the tax code changes began to support it.

Chapter II

THE CONCEPT AND MEASUREMENT OF TAX PROGRESSIVITY

An amount of tax t levied on a base y can be expressed as

$$t = f(y). \quad (1)$$

The tax might be proportional, in which case the ratio t/y would be constant. Progression or graduation in a tax is a departure from proportionality. A tax may depart from proportionality in two ways. The ratio t/y may increase as the base, y (e.g., income) increases in which case the tax would be progressive, or the ratio t/y may decrease as y increases, in which case the tax would be regressive.

There is no disagreement among contemporary writers concerning the definition of a progressive tax. However, there is no widely accepted methodology available for measuring the degree of tax progressivity. Attempts to compare the progressivity of different taxes or the same tax over time have led to confusing and contradictory results.

The confusion is a result of the need to answer several questions.

- (1) What should be measured, the legislated rate structure, or the effective rates?

- (2) What economic units should be used for the the income base - individuals or families? Should actual units be sampled to determine tax and income data or should estimated taxes and income be used for hypothetical units?

These questions will be addressed in Chapter II.

Several measures of tax progressivity require formal incidence studies. For these measures, two additional questions arise.

- (1) What shifting and incidence assumptions should be made?
- (2) For a given set of incidence assumptions, what allocators should be used to apportion the total tax revenue among the tax-income units?

These questions will be examined in Chapter III.

Measures of Tax Progressivity

A. C. Pigou and Hugh Dalton, in the 1920's, were among the first to examine the problem of measuring tax progressivity.¹³ Dalton described three types of

¹³Hugh Dalton, Principles of Public Finance, (New York: Augustus M. Kelley Publishers, 1967), pp. 106-111; A. C. Pigou, A Study in Public Finance, (London: Macmillan & Co., 1949), pp. 46-51.

measures, local (or point), general (or global), and indirect. He began with what he called the simple idea that if tax rate t falls on income x , the degree of progressivity p , at a point or level of income, is given by dt/dx . With this method, a tax is progressive, proportional, or regressive as p is positive, zero, or negative. This is a local measure which can differ at each point or over each interval of the tax function; therefore it tells us little of the degree of progressivity of the tax scale as a whole.

A general measure is one that will provide a single coefficient for an entire tax scale. Dalton suggested that a general measure can be obtained by summing, on a weighted basis, the local coefficients of progressivity that describe the tax. The weighting factor can be either the number of individuals or the amount of income at a point or over an interval of the tax function.¹⁴

The third type of measure suggested by Dalton

¹⁴This general measure of progressivity can be used for all tax functions regardless of their shape. Dalton also offers two measures of dispersion (relative mean deviation and relative mean difference) which can be used as general measures of progressivity; however, these are only appropriate for the tax functions which rise or fall continuously over their entire range. For a discussion of these measures see Hugh Dalton, Principles of Public Finance, p. 107.

measures the degree of progressivity indirectly by using a measure of dispersion, such as the Gini coefficient, to examine the change the tax system makes on the inequality in the distribution of income. This measure of progressivity is given by:

$$p = g - g' + k \quad (2)$$

where g and g' are descriptions of the inequality in the distribution of income before and after tax respectively. These inequalities can be defined using any one of the several standard measures of inequality or dispersion such as the Gini coefficient. The positive constant " k " is chosen to allow for the fact that after tax inequality is increased, not only by regression and proportionality, but even by milder degrees of progression."¹⁵

All subsequent efforts to measure progressivity fall into one of these three categories. I will use this framework to examine the dozen or so different methods that have been used to measure tax progressivity.¹⁶

¹⁵Hugh Dalton, Principles of Public Finance, p. 110.

¹⁶J. B. Bracewell-Milnes, "The Concept of Intension: A New Approach to the Progressiveness of Taxes," Public Finance 22 (1967); Richard A. Musgrave and Tun Thin, "Income Tax Progression, 1929-1948," Journal of Political Economy 56 (December 1948); and Richard Slitor, "The Measurement of Progressivity and Built-in Flexibility," Quarterly Journal of Economics 62 (February 1948).

Local Measures

The local measures, those which can differ at each point or over each interval of the tax function, include (1) average rate progression (ARP), (2) marginal rate progression (MRP), (3) liability progression (LP), (4) residual income progression (RIP), and (5) Slitor's Measure (SM).¹⁷ All these approaches measure progressivity directly as either the slope of the rate curve, the elasticity of the tax, the residual income curve, or as a tax income ratio.

Average rate progression and marginal rate progression are given by the slope of the average and the marginal rate curves respectively. The average rate curve is obtained by plotting the average tax rate t/y against the base y , which in most cases is income. ARP measures progressivity as the slope of this average rate curve.

ARP may be written as:

$$p_{arp} = \frac{r_2 - r_1}{y_2 - y_1} \quad (3)$$

where r_1 is the average tax rate t_1/y_1 at income y_1 and r_2 is the average tax rate t_2/y_2 at income y_2 , when $y_2 > y_1$. Computations are usually made by substituting

¹⁷Average Rate Progression is similar to Dalton's local measure but he did not use this term to describe it.

the tax rate expressed as a percent and income in thousands of dollars. For example, if we substitute the values for r_1 , r_2 , y_1 , and y_2 shown in Figure 1 (page 25) for Tax Schedule 1 (Table 4, page 26), we have the following:

$$p_{arp} = \frac{21\% - 11\%}{\$3 - \$1} \quad (4)$$

$$p_{arp} = 5$$

We obtain a coefficient of progressivity of 5. A positive ARP coefficient indicates a progressive tax, a coefficient of zero indicates a proportional tax, a negative coefficient indicates a regressive tax.

Marginal rate progression (MRP) is similar in principle to average rate progression (ARP) but measures the progressivity of the marginal rate curve not the average rate curve. The marginal rate curve is obtained by plotting the marginal tax rate $\Delta t/\Delta y$ against the base y which, as with ARP, is usually income and MRP measures progressivity as the slope of this marginal rate curve. One special problem with MRP is that although the average rate curve typically is continuously rising (or falling), the marginal rate curve for many major taxes is not a smooth curve. This makes it necessary to fit a smooth curve before calculating progressivity. Progressive, proportional, and regressive taxes are, as with

FIGURE 1

EFFECTIVE RATE CURVES FOR TWO HYPOTHETICAL TAX SCALES (TS1 AND TS2)

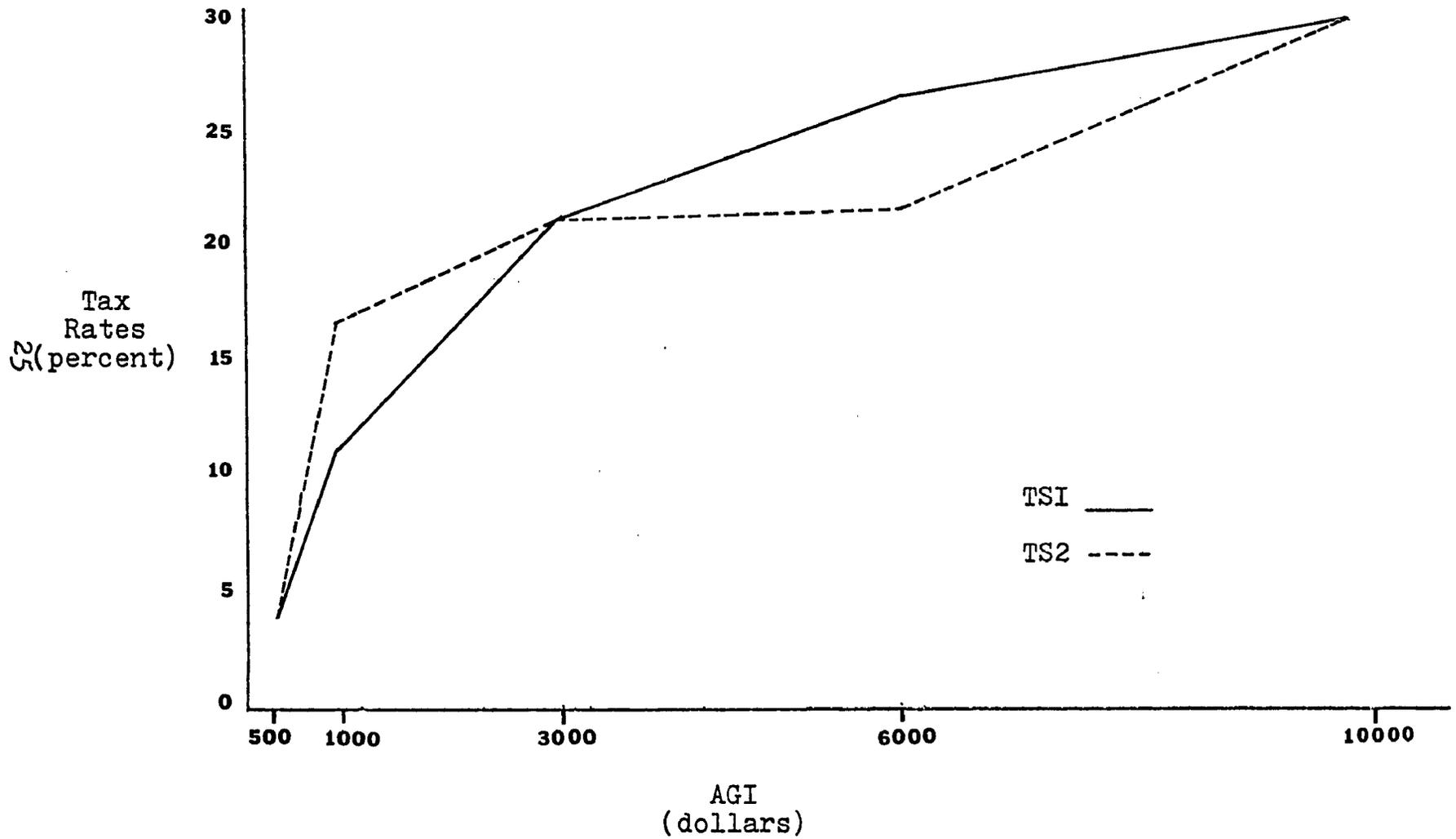


TABLE 4

AVERAGE RATE PROGRESSION
LIABILITY PROGRESSION FOR
TWO HYPOTHETICAL TAXES

Income Class	Average Income in Class	Average Tax in Class	Average Tax Rate	Tax Scale 1		ARP	LP	RIP
				Average Residual Income	Average Tax Rate			
under \$800	\$ 500	\$ 20	4%	\$ 480	11	14.00	4.50	.854
801-1,600	1,000	110	11	890	21	5.00	9.45	.832
1,601-4,500	3,000	630	21	2,370	27	2.00	1.57	.848
4,501-7,500	6,000	1,620	27	4,380	30	.75	.57	.797
7,501 and over	10,000	3,000	30	7,000				
LSLRP				Unweighted Sum		21.75	16.09	.893

Income Class	Average Income in Class	Average Tax in Class	Average Tax Rate	Tax Scale 2		ARP	LP	RIP
				Average Residual Income	Average Tax Rate			
under \$800	\$ 500	\$ 20	4%	\$ 480	17	26.00	7.50	.729
801-1,600	1,000	170	17	830	21	2.00	5.41	.928
1,601-4,500	3,000	630	21	2,370	22	.33	1.10	.975
4,501-7,500	6,000	1,320	22	4,680	30	2.00	.85	.661
7,501 and over	10,000	3,000	30	7,000				
LSLRP				Unweighted Sum		30.33	14.86	.913

ARP, indicated by positive, zero, and negative coefficients respectively.

Since the slope of the average rate curve of Tax Structure 1 in Figure 1 and the slope of the marginal rate curve for most taxes is not the same over the entire income range (i.e., these curves are not straight lines), the degree of progressivity is different at different points and over different parts of the income range. This is typical of the average and marginal rate curves of most non-proportional taxes.¹⁸

Liability progression (LP) and residual income progression (RIP) are both elasticity measures. LP measures tax progressivity as the adjusted gross income elasticity of taxes (i.e., the responsiveness of payments to changes in income). RIP measures tax progressivity as the adjusted gross income elasticity of residual income (i.e., the responsiveness of residual income to changes in income).

LP may be written as

$$P_{lp} = \frac{t_2 - t_1}{t_1} * \frac{y_1}{y_2 - y_1} \quad (5)$$

¹⁸All proportional and those non-proportional taxes characterized by straight line average and marginal rate curves have a progressivity that is the same at every point and over every income range. The slope of the tax function will be the same at every point and over every range of income.

where t_1 is the amount of tax paid at income y_1 and t_2 is the amount of tax paid at income y_2 . LP coefficients will be greater than one for a progressive tax, equal to one for a proportional tax, and less than one for a regressive tax.

RIP may be written as

$$P_{rip} = \frac{ri_2 - ri_1}{ri_1} * \frac{y_1}{y_2 - y_1} \quad (6)$$

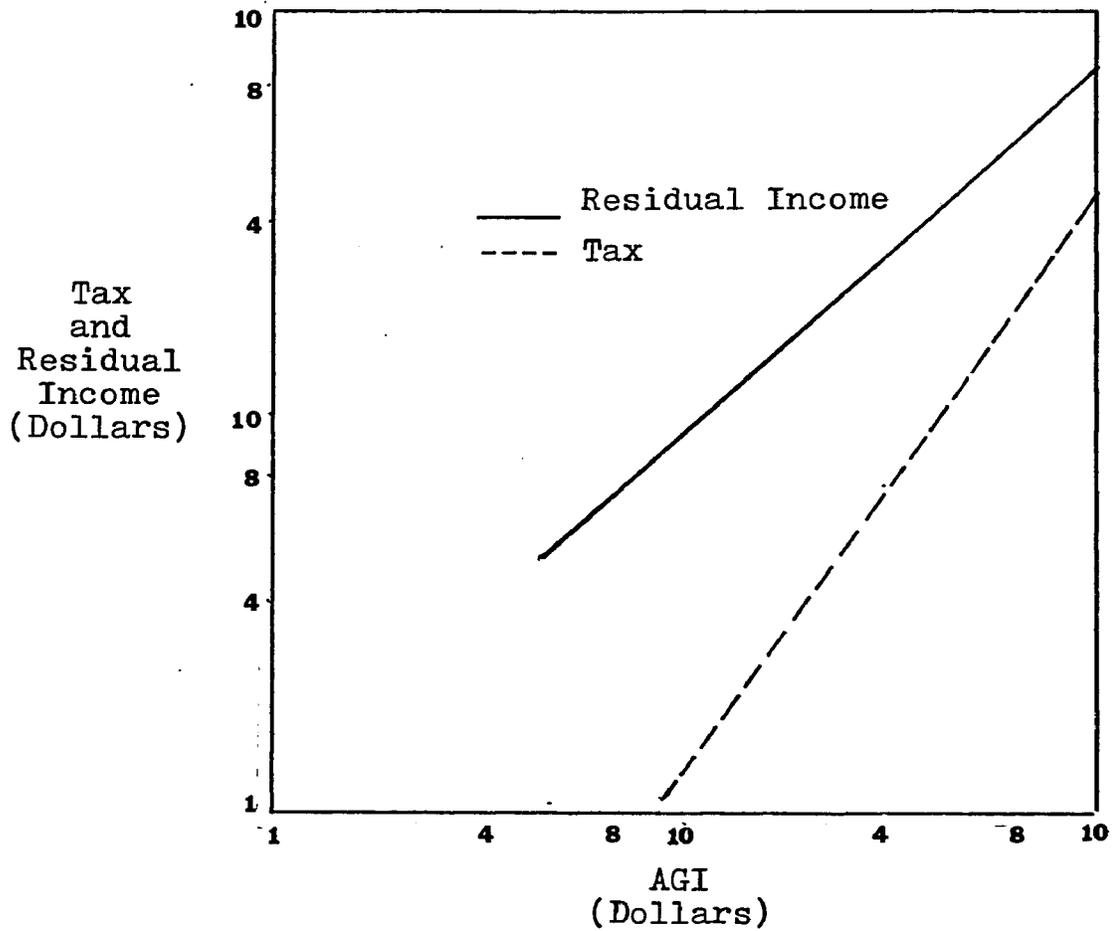
where ri_1 is the residual income (i.e., after tax income) at income level y_1 and ri_2 is the residual income at income level y_2 . For RIP, a coefficient of less than one indicates a progressive tax, a coefficient of one indicates a proportional tax, and a coefficient greater than one indicates a regressive tax.

Whereas ARP and MRP were defined by the slope of their respective functions plotted on arithmetic scales, LP and RIP are given by the slope of the curve obtained by plotting, on full log paper, tax liability against pre tax income and residual income against pre tax income respectively.

Since the slopes of the log plots of tax liability against income and residual income against income for Tax Structure 1 in Figure 2 are not the same over the entire income range (i.e., are not straight lines), the degree of progressivity by LP and RIP, as with other

FIGURE 2

RELATION OF TAX AND RESIDUAL INCOME
TO INCOME, TSI



local measures, is different at different points and over different income ranges. This is often typical of both the tax liability and residual income functions and this makes the comparison of different taxes or the same tax over time difficult.

Slitor's Measure (SM) is another local measure of tax progressivity. It is defined at income level y , before deducting personal exemptions, as the difference between the marginal tax rate r at income y and the average tax rate e at income y divided by income y . It is written as

$$p_{sm} = \frac{r - e}{y} \quad (7)$$

A positive coefficient indicates a progressive tax, a coefficient equal to zero indicates a proportional tax, and a coefficient less than zero indicates a regressive tax. This measure, like the other local measures, provides a different coefficient or progressivity at each point on the tax function.

Except for special cases, for example a proportional tax, all local measures provide a different coefficient of progressivity for each income point or income range.

In addition to not providing a single coefficient, ARP and MRP do not distinguish between tax schedules which differ over their entire range by the same number

of percentage points and LP and RIP do not distinguish between taxes which differ by an equal proportionate amount over their entire range. The overriding shortcoming of all local measures is the inability to provide a single summary measure of progressivity for the entire tax scale. This makes it difficult to compare the progressivity of different taxes or the same tax over time.

The two hypothetical tax scales, Tax Structure 1 (TS1) and Tax Structure 2 (TS2) presented in Table 4 demonstrate the difficulty of interpreting the local measures of tax progressivity. Both tax functions cover the same income range, both have average rates beginning at four percent on an income of \$500 and rising to 30 percent on an income of \$10,000. However, the rates vary between these points. Table 4 shows the coefficients of progressivity computed according to both ARP and LP. TS1 is by both measures more progressive than TS2 over the middle incomes (those between \$1,000 and \$6,000). TS2 is by both measures more progressive than TS1 for extreme incomes (those less than \$1,000 and greater than \$6,000). However, when we attempt to compare the progressivity of these two tax scales in their entirety, contradictory results are obtained. If we take the unweighted arithmetic sum of the local coefficients for each tax scale for ARP and LP, we see that

using ARP, TS2 is more progressive than TS1 but by LP, TS1 is more progressive than TS2. There are a number of different weighting factors, each equally justifiable, that could be used to try to minimize or eliminate the problems that arise when trying to compare different taxes, but even in simple cases, this is difficult.

The appropriateness or "correctness" of a measure of progressivity can also be evaluated as to its consistency with the basic philosophical justification of a progression policy. Historically, it has been equity theory embodied in the form of various sacrifice formulae, that have provided the framework within which writers have attempted to justify tax progressivity.¹⁹ However, Musgrave held that it is not possible to develop a rigorous case for any of the measures of progressivity on the grounds of any of the sacrifice

¹⁹The equity criterion or rule is the most important of a number of requirements for a "good" tax. According to R. A. Musgrave this rule calls for each taxpayer to contribute his fair share to the cost of government. But he acknowledges a lack of agreement concerning a definition of fair share. Among several different approaches to the equity or fair share question is one which holds that people should contribute to the cost of government in line with their "ability to pay." Since J. S. Mill, the ability-to-pay rule has been viewed in terms of an equal sacrifice prescription which holds that taxpayers are treated equally if their tax payments involve an equal sacrifice or loss of welfare (see J. S. Mill, Principles of Political Economy, vol. 2, pp. 394-417).

formulae. He pointed out several reasons for this:

- (1) All attempts to measure sacrifice require the assumption that all income utility curves are the same. This is almost certainly not so.
- (2) If we accept the conclusion of modern welfare theorists that it is not possible to make interpersonal utility comparisons, then the basis of equity theory is lost and its usefulness in justifying anything is also lost.²⁰

The demise of equity theory as a foundation for progressivity has been accompanied by the recognition that the essence of any progression policy is greater income equality. This shift in emphasis began in the 1920's with the work of Dalton and Pigou, and was given added support by Musgrave in the 1940's and is accepted by most contemporary writers including Ulf Jakobsson and Richard Goode.

Implicit in the justification of a progression policy on redistributive grounds is that a tax which is

²⁰Musgrave and Thin, "Income Tax Progression, 1929-48," Journal of Political Economy 56 (December 1948), pp. 512-13; Musgrave and Musgrave, Public Finance in Theory and Practice, pp. 198-204.

more progressive must also be more redistributive. Jakobsson takes this as a point of departure to examine the local measures of progressivity in an effort to determine which measures can be justified or be deemed the "correct" measures, given income redistribution as the justifying framework.

He accepts Lorenz criteria as a reasonable method of ranking income distributions with respect to income inequality (or equality). He then suggests how this criteria can be used to decide whether one tax is more or less redistributive than another. Thus, if "two tax schedules give rise to income distributions after tax with nonintersecting Lorenz curves, then the tax schedule related to the dominated Lorenz curve can be considered unambiguously more redistributive than the other." He concludes, "that as soon as the context chosen is income redistribution judged by Lorenz criteria, there is only one logical (local) measure of progressivity," and it is residual income progression (RIP).²¹ This means that of the local measures only one, RIP, is the "correct" measure to use when income redistribution is the justifying framework.

²¹Ulf Jakobsson, "On the Measurement of the Degree of Progression," Journal of Public Economics 5 (January-February 1976), p. 162.

To sum up, the local measures generally give a different coefficient of progressivity at each income level or over each income range. This makes it difficult to compare different taxes or the same tax over time. In addition, none of these measures, RIP being an exception, are consistent with the basic philosophical justification of a progression policy.

General Measures

These techniques measure progressivity directly by examining tax, residual income, or rate functions or curves. However, unlike the local measures, these measures have the capacity to provide a single coefficient of progressivity for a particular tax or set of taxes. There are three general measures: (1) least squares logarithmic liability progression (LSLLP), (2) least squares logarithmic residual income progression (LSLRP), and (3) a measure called intension (INT).

LSLLP is a measure of the slope of the least squares trend line of the curve obtained when the log of tax revenue is plotted against the log of AGI on full log paper. LSLRP measures progressivity as the slope of the least squares trend line of the curve obtained when the log of residual income is plotted against the log of AGI on full log paper.

These measures, LSLLP and LSLRP, are developed from LP and RIP, respectively, by recognizing that tax functions and residual income functions are exponential, not linear, and that the log transform of an exponential function can be approximated by a linear function, estimated using the least squares technique.

The estimating equation for LSLLP is given by

$$\log t = \log a_0 + a_1 \log y \quad (8)$$

and for LSLRP it is

$$\log ri = \log a_0 + a_1 \log y \quad (9)$$

where t is tax revenue, y is income (AGI), ri is residual income, and a_1 is in both cases the slope of the least squares trend line and the coefficient of progressivity. For LSLLP, this coefficient is greater than one for a progressive tax, equal to one for a proportional tax, and less than one for a regressive tax. In the case of LSLRP progression is indicated by a coefficient that is less than one, proportionality by a coefficient equal to one, and regression by a coefficient that is greater than one.

Bracewell-Milnes developed a measure of progressivity that he called intension (INT) to do what, in his view, the gradient and indirect measures of progressivity failed to do - namely, permit easy comparison of the progressivity of different tax scales. He defined

INT as, "the rise in the (marginal) rates of tax levied on successive increments of some such variable as income, wealth, or expenditure in the hands of a single taxpayer."²²

INT can be computed in several different ways. The diagram of the minimax area in Figure 3 is helpful in understanding two ways of computing INT. The areas in Figure 3 can be used to calculate INT according to either of the following expressions:

$$P_i = \frac{AI}{AI + AT} \quad (10)$$

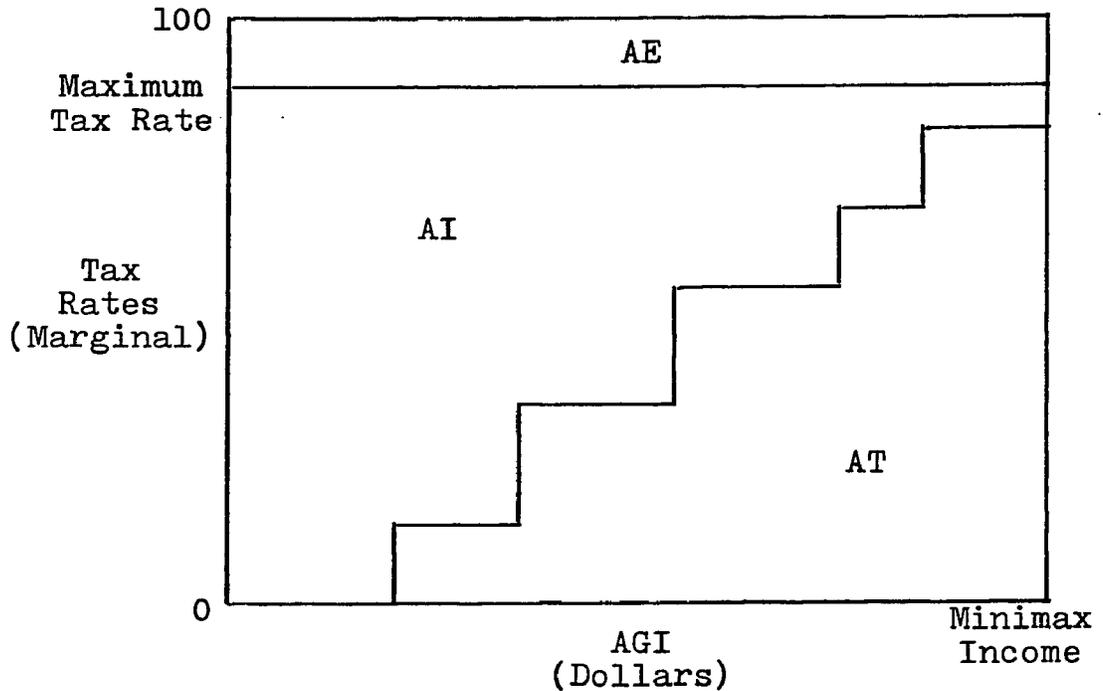
$$P_i = \frac{AI}{AI + AT + AE} \quad (11)$$

where p_i is the coefficient of progressivity, AI the area of intension, AT the area of tax, and AE the area of exemption. INT is responsive to three variables, the minimax level of income, the level of the maximum tax rate, and the difference between the maximum and lower rates. Progression is indicated by a coefficient greater than zero ($P_i > 0$) and proportionality by a coefficient equal to zero ($P_i = 0$).

The single coefficient aspect of these three

²²Bracewell-Milnes, "The Concept of Intension: A New Approach to the Progressiveness of Taxes," Public Finance 22 (1967), p. 525.

FIGURE 3
THE MINIMAX AREA



Key to Symbols and Terms:

Minimax Taxpayer - the taxpayer receiving the smallest income to which the maximum rates apply.

Minimax Area - the minimum level of income to which the maximum tax rate applies.

Maximum Tax Rate - the highest marginal rate at which income is taxed.

AE (Area of Exemption) - the excess of the minimax taxpayer's net income over the area of intension.

AI (Area of Intension) - the area of difference between the maximum tax rate and lower or zero rates below the minimax.

AT (Area of Tax) - the tax paid by the minimax taxpayer.

measures gives them an advantage over the local measures when the objective is comparing the progressivity of different taxes or the same tax over time. But while the single coefficient requirement is a necessary one, it is not sufficient to make these or any measures acceptable for use in this study. For the measure we need must also be consistent with the redistributive justification of a progression policy, that is, that it must meet Jakobsson's requirement.

The consistency requirement as stated by Jakobsson holds that when redistributive effect is the raison d'etre for a progression policy, then a tax that by a measure is more progressive must also be more redistributive in the direction of greater equality according to Lorenz criteria. The two tax systems, Tax Structure 2 (TS2) and Tax Structure 3 (TS3) described in Figure 4 and Table 5 demonstrate that the LSLLP measure does not satisfy Jakobsson's consistency requirement. TS2 and TS3 have LSLLP coefficients of 1.55 and 1.37 respectively.²³ These coefficients indicate that TS2 is more

²³These LSLLP coefficients are computed from columns (1) and (2) of Table 5 by taking the base 10 logarithms of the average income in the class and the average tax in the class, and then fitting a straight line to these points using least squares. The slopes of these least square estimates are the LSLLP coefficients.

FIGURE 4
EFFECTIVE RATE CURVES FOR TWO HYPOTHETICAL TAX SCALES (TS2 AND TS3)

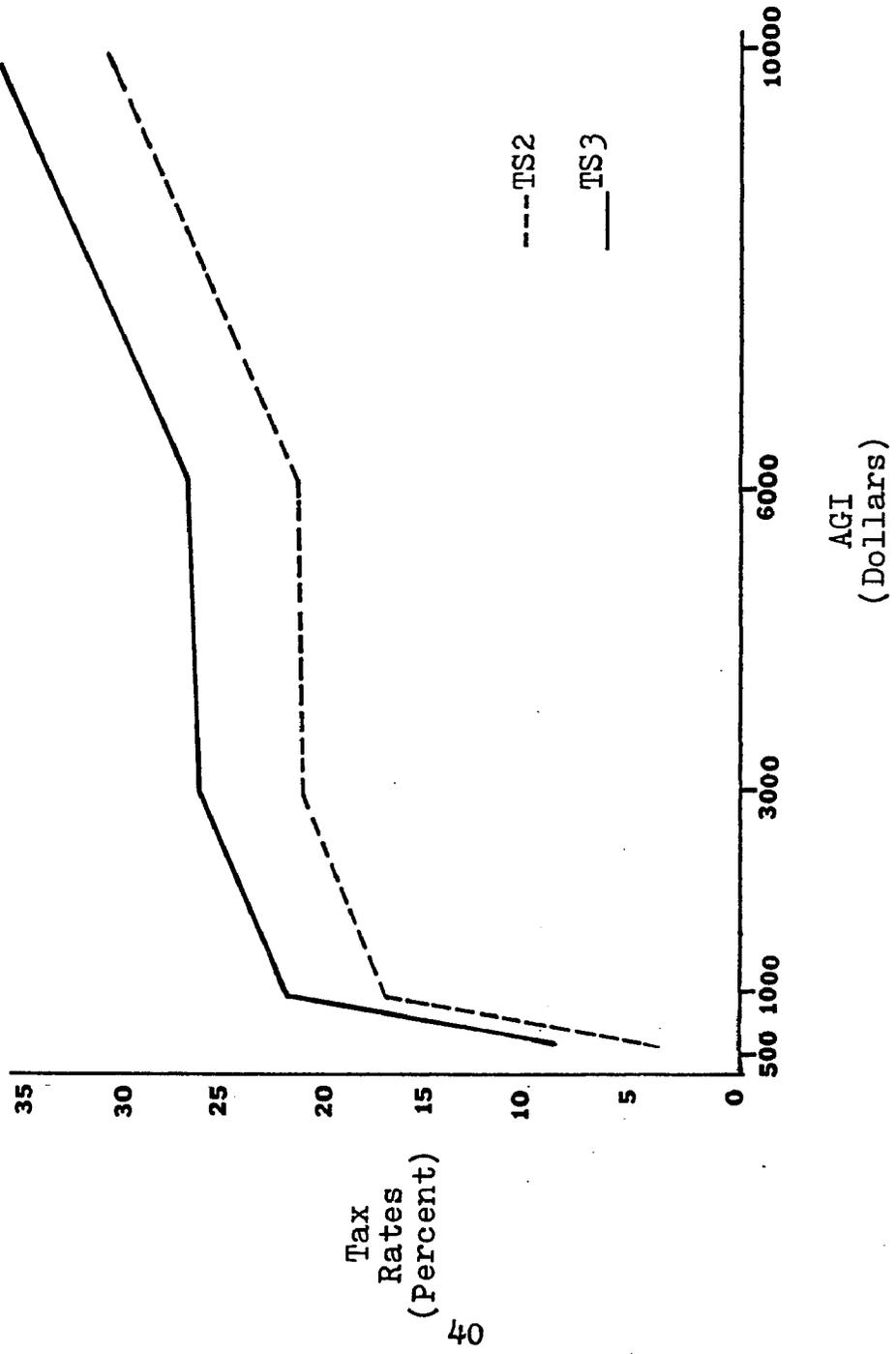


TABLE 5

RESIDUAL INCOME PROGRESSION
AND THE DISTRIBUTION OF INCOME
BEFORE AND AFTER TAX FOR
TWO HYPOTHETICAL TAXES

Income Class	Average Income in Class	Average Tax in Class	Average Tax Rate	Residual Income (RI)	No. Families in Class	Total Income in Class	Total RI in Class	Cumulative Percent Total Income	Cumulative Percent Total RI	RIP
Tax Scale 2										
under \$800	\$ 500	20	4%	\$ 480	20	\$ 10,000	\$ 9,600	3.5%	4.3%	.73
801-1,600	1,000	170	17	830	30	30,000	24,900	14.0	15.5	.93
1,601-4,500	3,000	630	21	2,370	25	75,000	59,250	40.4	42.2	.98
4,501-7,500	6,000	1,320	22	4,680	20	120,000	93,600	82.5	84.3	.75
7,501 and over	10,000	3,000	30	7,000	5	50,000	35,000	100.0	100.0	
Tax Scale 3										
under \$800	\$ 500	45	9%	\$ 455	20	\$ 10,000	\$ 9,100	3.5%	4.4%	.71
801-1,600	1,000	220	22	780	30	30,000	23,400	14.0	15.6	.92
1,601-4,500	3,000	780	26	2,220	25	75,000	55,500	40.4	42.3	.97
4,501-7,500	6,000	1,620	27	4,380	20	120,000	87,600	82.5	84.4	.73
7,501 and over	10,000	3,500	35	6,500	5	50,000	32,500	100.0	100.0	
LSLLP - 1.55										
LSLLP - 1.37										

progressive than TS3 but TS2 is not more redistributive than TS3 as can be seen from the fact that the Lorenz curves for the two taxes shown in Figure 5 reveal less inequality under TS3 than under TS2. In other words, the more progressive tax, according to LSLLP, is TS2 but TS3 has greater redistributive effect according to Lorenz criteria.

INT also fails to satisfy Jakobsson's consistency requirement. The two tax scales, Tax Structure 4 (TS4) and Tax Structure 5 (TS5) shown in Table 6 and Figure 6, demonstrate this problem with INT. TS4 has a coefficient of progressivity of .968 and TS 5 one of .517.²⁴ This means that TS4 is by INT more progressive than TS5 but TS5 is more redistributive. This can be seen in Figure 7 by the fact that there is less inequality in the distribution of after tax income under TS5 than under TS4.

INT is unacceptable for use in this study for still another reason. In addition to the two computational options for INT shown above in equations (1) and (2),

²⁴These progressivity coefficients are computed using equation (10), and substituting values computed from the minimax areas in Figure 6. The (AI + AT) area for both TS4 and TS5 is the same 3600, $(.04 * 4500)$, but the AI areas are different. TS4 has an AI area of 3484, $[3600 - (4500 - 1600) * .04]$, and for TS5 the AI area is 1860, $[3600 - ((4500 - 1600) * .6)]$.

FIGURE 5

LORENZ CURVES OF THE DISTRIBUTION OF INCOME
BEFORE AND AFTER TAX
FOR TWO HYPOTHETICAL TAX
SCALES, TS2 AND TS3

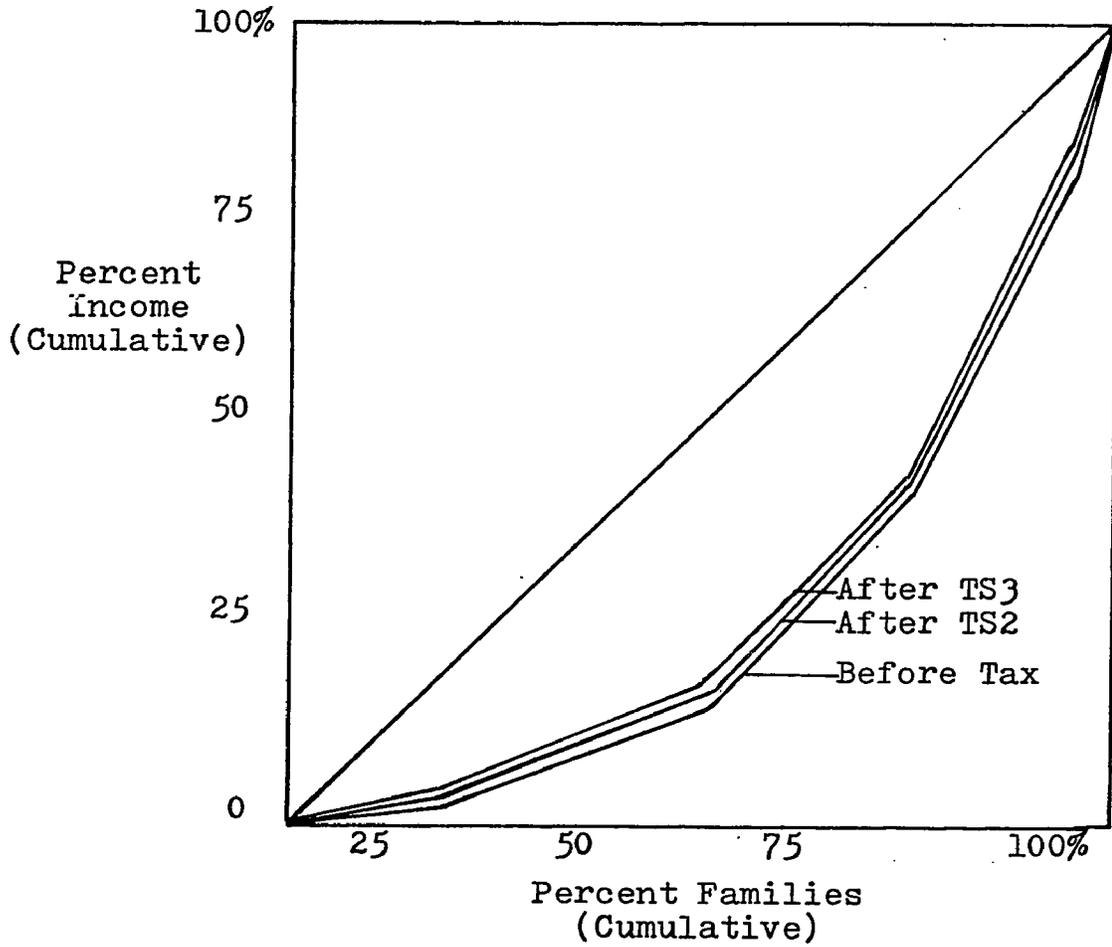


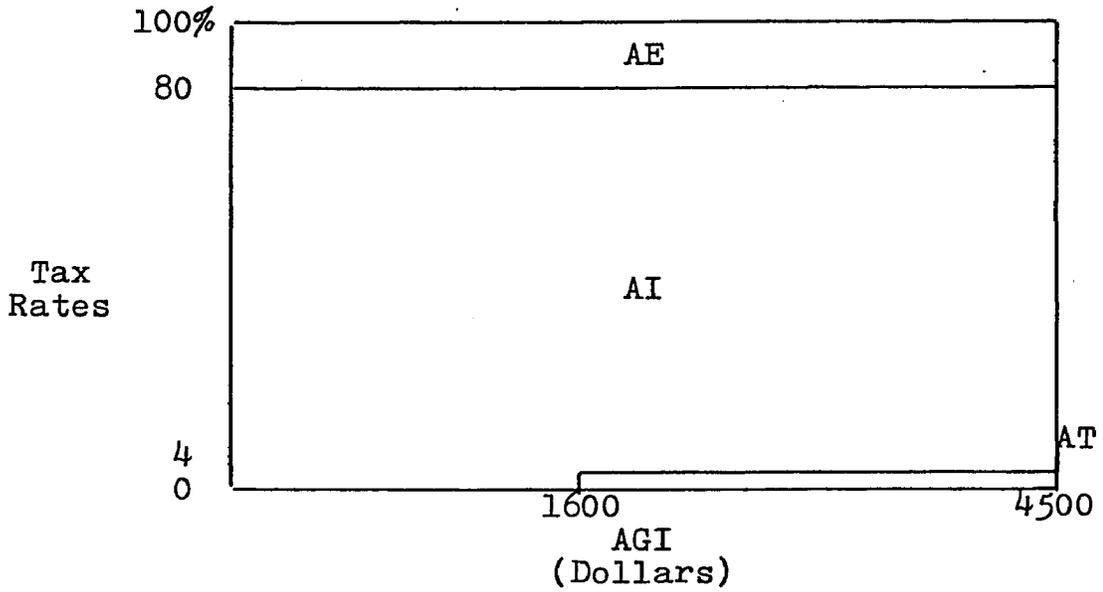
TABLE 6

INTENSION
AND THE DISTRIBUTION OF INCOME
BEFORE AND AFTER TAX FOR
TWO HYPOTHETICAL TAXES

Income Class	Aver- age Income in Class	Aver- age Tax in Class	Aver- age Tax Rate	Resid- ual Income (RI)	No. Fami- lies in Class	Total Income in Class	Total RI in Class	Cumu- lative Percent Total Income	Cumu- lative Percent Total Income
under \$800	\$ 500	\$ 0	0%	\$ 500	25	\$12,500	\$12,500	8.2%	9.9%
801-1,600	1,000	0	0	1,000	50	50,000	50,000	41.0	49.6
1,601-4,500	3,000	120	4	2,880	20	60,000	57,600	80.3	95.2
4,501 and over	6,000	4,800	80	1,200	5	30,000	6,000	100.0	100.0
Tax Scale 4									
INT - .968									
under \$800	\$ 500	\$ 0	0%	\$ 500	25	\$12,500	\$12,500	8.2%	13.5%
801-1,600	1,000	0	0	1,000	50	50,000	50,000	41.0	67.6
1,601-4,500	3,000	1,800	60	1,200	20	60,000	24,000	80.3	93.5
4,501 and over	6,000	4,800	80	1,200	5	30,000	6,000	100.0	100.0
Tax Scale 5									
INT - .517									

FIGURE 6
 THE MINIMAX AREA FOR
 TWO HYPOTHETICAL TAX SCALES

Tax Scale 4



Tax Scale 5

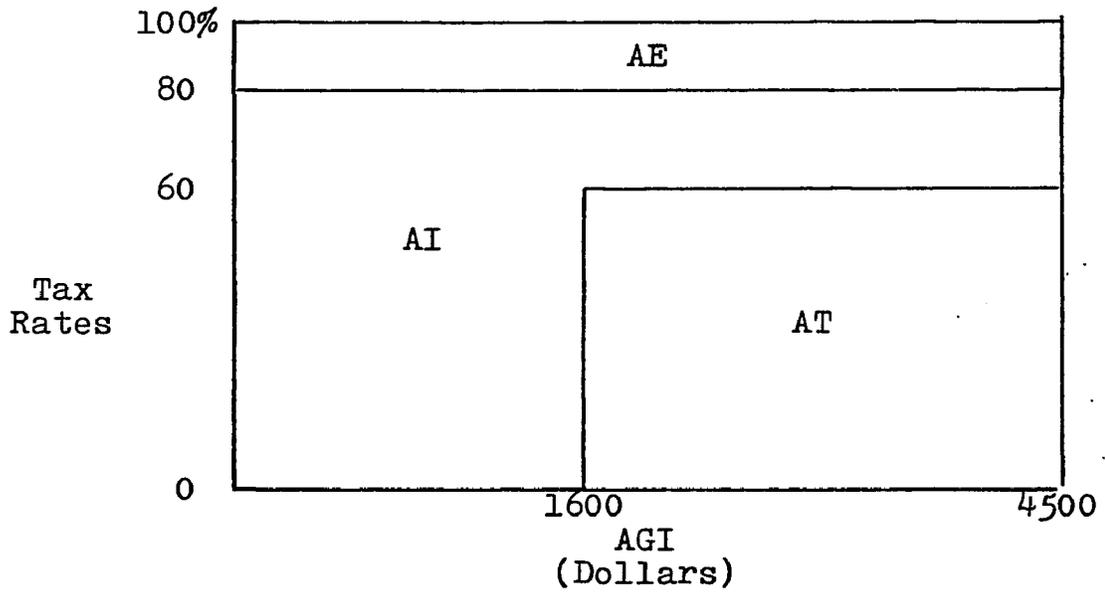
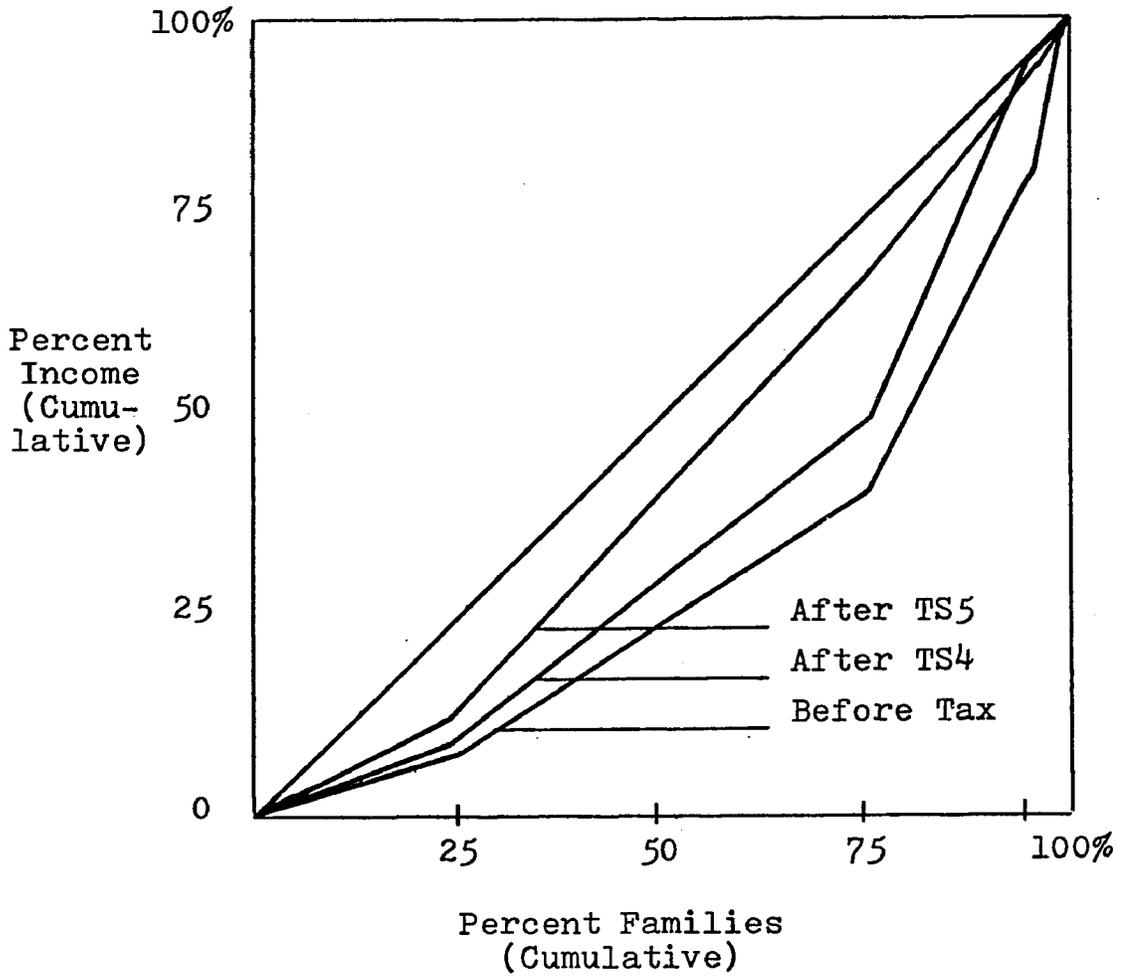


FIGURE 7

LORENZ CURVES OF THE DISTRIBUTION
OF INCOME BEFORE AND AFTER TAX
FOR TWO HYPOTHETICAL TAX SCALES,
TS4 AND TS5



there is another that must be used when comparing tax scales for different time periods. This third method makes use of minimax adjustment factors. These are employed to adjust the measure for the fact that the number of people for whom the maximum tax rate applies may be different for different taxes or even for the same tax over time. But it is not clear how to select or compute minimax adjustment factors and for certain types of taxes, Bracewell-Milnes contends that the minimax adjustment factors are not applicable without further adjustments. In short, INT is both difficult to use and to interpret.

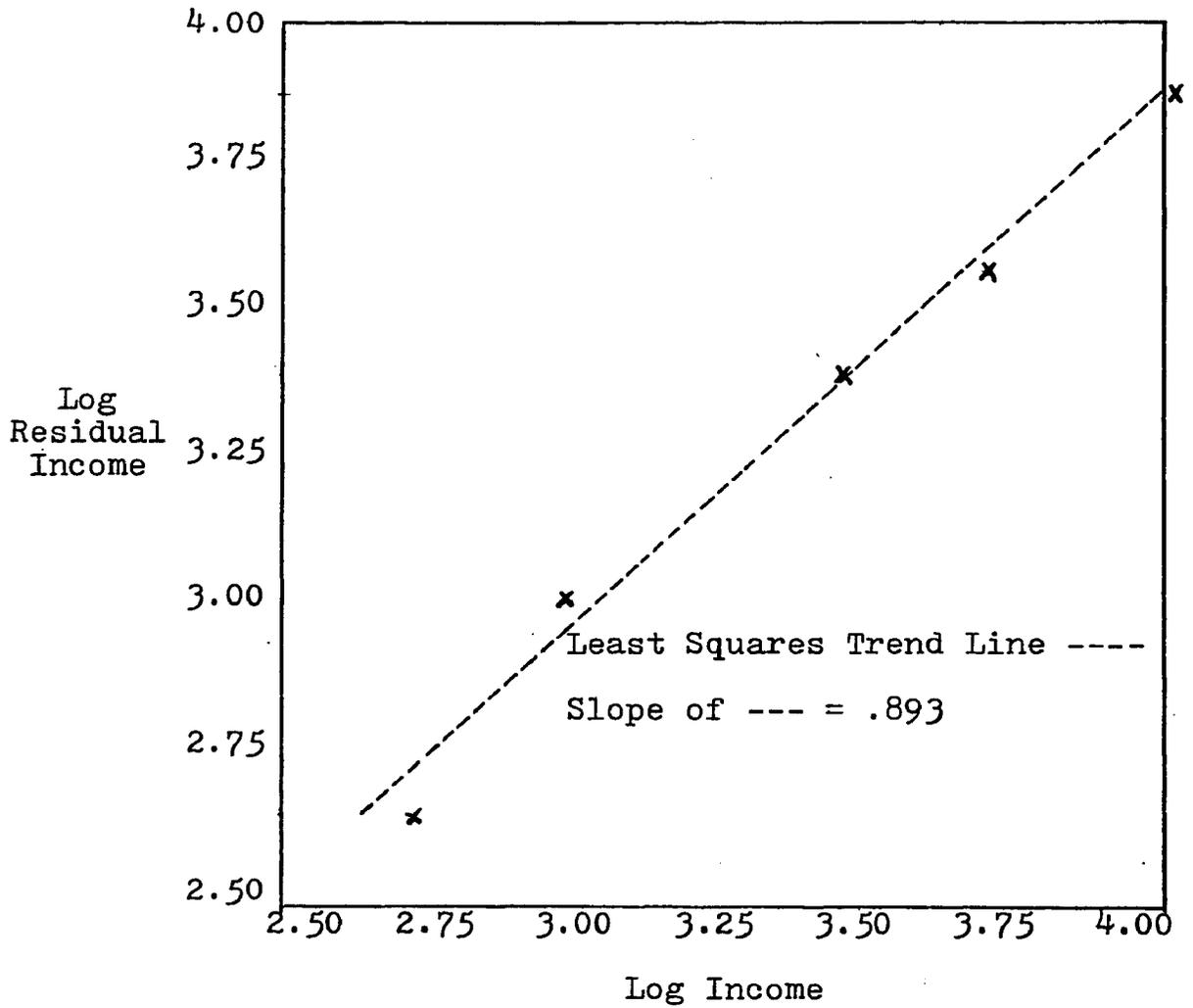
Then we must conclude that LSLLP and INT are both unacceptable for use as measures of progressivity due to their failure to satisfy Jakobsson's consistency requirement, the difficulty in using them, and the ambiguity in interpreting them.

Least squares logarithmic residual income progression (LSLRP) is also a general measure that provides a single coefficient of progressivity which is the slope of the least squares trend line of the log transform of RIP. LSLRP also satisfies Jakobsson's consistency requirement. Figure 8 shows LSLRP graphically for TSI as set out in Table 4.

LSLRP can also give ambiguous results when

FIGURE 8

RELATION OF LOG OF RESIDUAL INCOME TO LOG OF INCOME
FOR A HYPOTHETICAL TAX SCALE (TSl IN TABLE 4)
SHOWING THE LEAST SQUARES TREND LINE,
THE SLOPE OF WHICH IS LSLRP



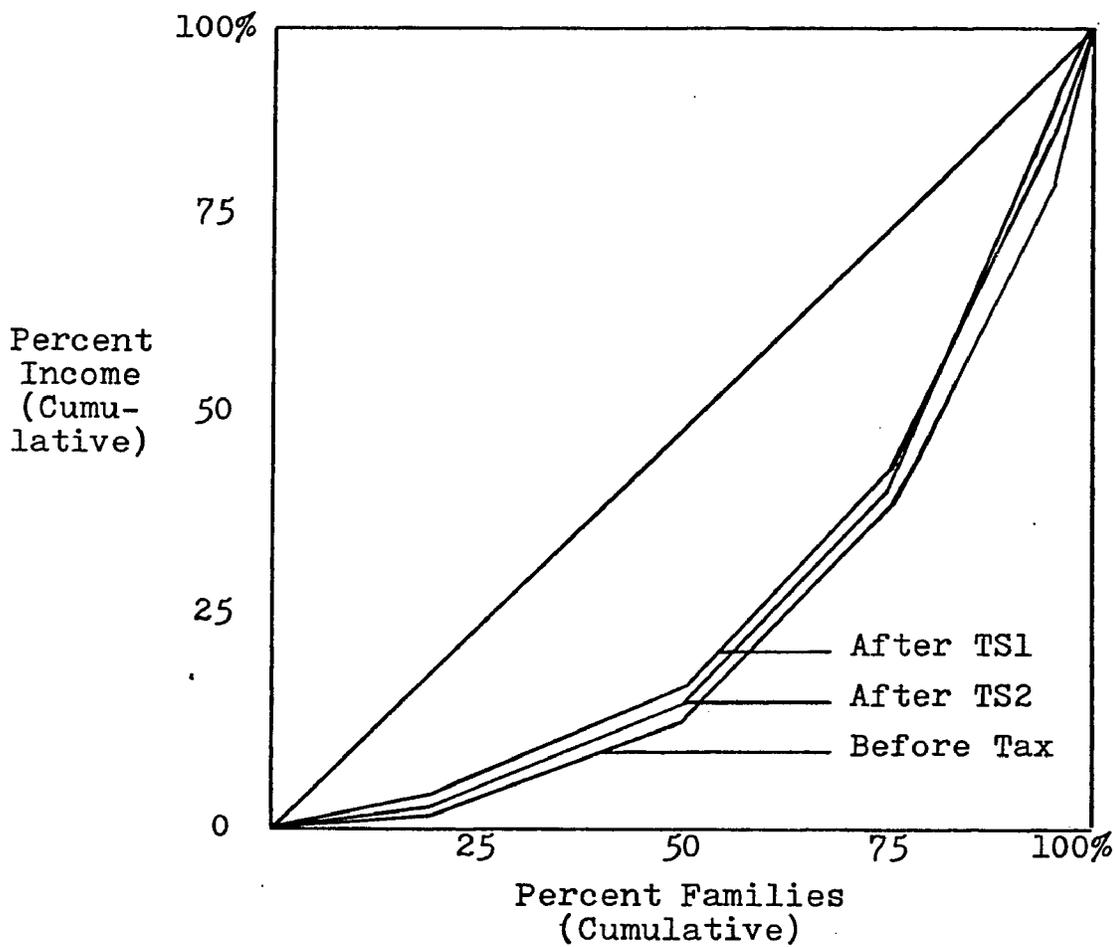
comparing two taxes. This means that it is not enough for the LSLRP coefficient of tax X to be greater than the LSLRP coefficient of tax Y to conclude that the former (tax X) is unambiguously more redistributive than the latter (tax Y). TS1 and TS2, both of which are shown in Table 4, are helpful in demonstrating how this ambiguity develops.

TS1 is more progressive than TS2 by LSLRP, but the Lorenz curves depicting the after tax distribution of income for these two tax scales may intersect (see Figure 9) so that neither dominates the other. The fact that the Lorenz curves intersect makes it impossible, on the basis of Lorenz criteria, to say that TS1 is more redistributive than TS2. This problem arises in that TS1, according to RIP, is not more progressive than TS2 over every income interval of the tax. We can see from the RIP coefficients for the two tax scales in Table 4 that TS1 is less progressive than TS2 for the low and high income units even though TS1 is over all more progressive than TS2 by LSLRP.

This problem can be resolved by imposing another criteria which holds that if tax X is more progressive than tax Y by LSLRP for tax X to unambiguously be more redistributive than tax Y, tax X must be more progressive than tax Y at every point and over every income

FIGURE 9

LORENZ CURVES OF THE DISTRIBUTION OF INCOME
BEFORE AND AFTER TAX FOR TWO
HYPOTHETICAL TAX SCALES, TS1 AND TS 2



range by RIP as well.

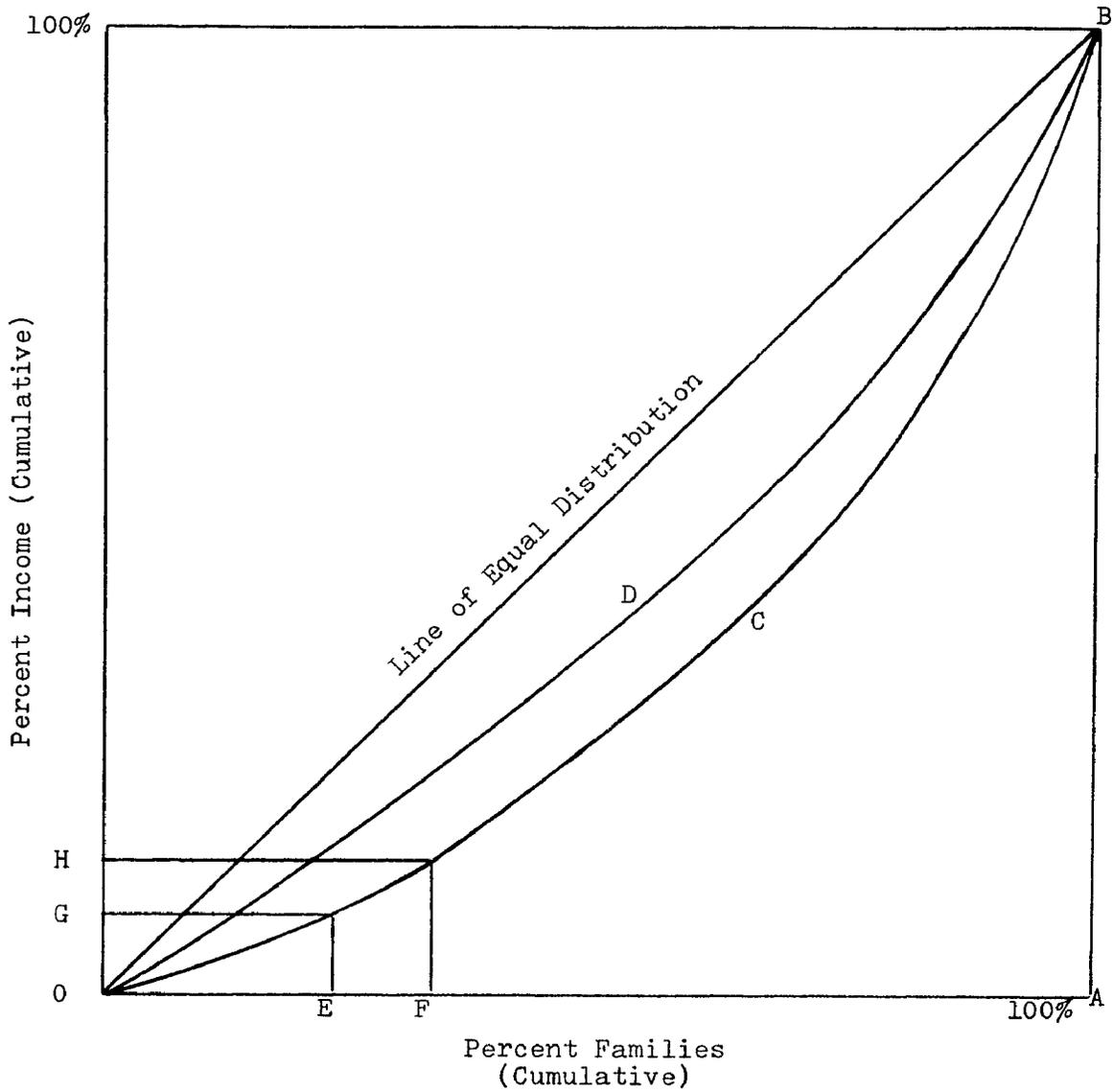
LSLRP, appropriately used, satisfies Jakobsson's consistency requirement, is easy to use, and affords no ambiguity in the rules for interpreting the coefficient. On the basis of these findings, LSLRP, supplemented by the RIP rule, is the most nearly "correct" of the measures discussed so far for evaluating different taxes or the same tax over time.

Indirect Measures

The indirect measures, (1) changing Gini coefficient (CGC) and (2) Musgraves' effective progression (EP), both measure progressivity as the impact of the tax on the distribution of income. The changing Gini coefficient (CGC) and effective progression (EP) are in principle the same, in that they both use the areas defined by the Lorenz curve to compute progressivity. However, they differ in that CGC uses the percent change in the area of inequality as the measure of progressivity, whereas EP uses the ratio of the after tax coefficient of equality to the before tax coefficient of equality.

The Lorenz curves depicted in Figure 10 are useful in illustrating the difference between these two measures. The horizontal axis measures the cumulative percentage of families, the vertical axis the cumulative

FIGURE 10
LORENZ CURVES SHOWING THE AREAS OF
INEQUALITY AND EQUALITY



percentage of income received. The curve OCB indicates that OE percent of the families receive OG percent of the income, and that the lowest OF percent of the families receive OH percent of the income, etc. If income is equally distributed among all families, the distribution of income is described by the 45° line OB.

When, according to Lorenz criteria, any inequality exists in the distribution of income, the area OBA in Figure 10 is divided by the curve ODB (the Lorenz curve) into an area of equality and an area of inequality. The area between the 45° line and the curve ODB is the area of inequality. The area bounded by the curve ODB, the horizontal axis, and a line perpendicular to the horizontal axis at 100% (in Figure 10 this is the area OABD) is the area of equality.

The two indirect measures differ from each other in that CGC defines progressivity in terms of the Gini coefficient which is a measure of the area of inequality, whereas EP defines progressivity in terms of the area of equality.

CGC is written

$$p_{cgc} = \frac{I_a - I_b}{I_b} * 100 \quad (12)$$

where I_a is the coefficient of inequality after tax and I_b is the coefficient of inequality before tax. In

Figure 10, if OCB describes the distribution of income before tax and ODB the distribution after tax, then

$$p_{cgc} = \frac{\frac{OBD}{OBA} - \frac{OBC}{OBA}}{\frac{OBC}{OBA}} * 100 \quad (13)$$

A negative percent change indicates a progressive tax; no change indicates a proportional tax; and a positive change indicates a regressive tax.

EP is written

$$p_{ep} = \frac{E_a}{E_b} \quad (14)$$

where E_a is the coefficient of equality after tax and E_b the coefficient of equality before tax. In Figure 10, if OCB again describes the distribution of income before tax and ODB the distribution of income after tax, then

$$p_{ep} = \frac{\frac{OABD}{OBA}}{\frac{OABC}{OBA}} \quad (15)$$

A coefficient greater than one indicates a progressive tax; one equal to one indicates a proportional tax; and a coefficient less than one indicates the tax is regressive.

Both CGC and EP define progressivity, proportionality, and regressivity in the same way. In each case, a tax is progressive if the distribution of after tax income is less unequally (more equally) distributed than

the before tax income, proportional if the tax does not alter the distribution of income, and regressive if the distribution of after tax income is more unequally (less equally) distributed than before tax income.

These indirect measures are also general or global measures, supplying a single coefficient for a particular tax or set of taxes. They satisfy Jakobsson's criteria by definition; for both, CGC and EP, a tax is progressive if income after tax is less unequally (more equally) distributed than before tax income according to Lorenz criteria.

There are some problems with the indirect measures. First, the Gini coefficient is not a very responsive measure of dispersion. It is, relative to other measures of dispersion or inequality, insensitive or unresponsive to inequality due to extreme poverty and extreme relative wealth. This means that the CGC measure of progressivity will not be responsive to changes in the amount of inequality among the extremely rich and extremely poor.²⁵ The indirect measures are similar to the general measures because with both there is always the possibility of canceling or offsetting changes.

²⁵D. G. Champernowne, "A Comparison of Measures of Inequality of Income Distribution," The Economic Journal 84 (December 1974), p. 803.

This means that the same coefficient can reflect very different tax rate structures.

Second, there are many different measures of dispersion, other than the Gini coefficient, that can be employed to analyze the distribution of income. These measures differ in their sensitivity to inequality. Champernowne, for instance, has identified three types of income inequality.²⁶

1. Inequality in the high income range.
2. Inequality in the middle income range.
3. Inequality in the low income range.

He analyzed how six different measures of dispersion reflect or respond to these three types of inequality.

The following is a list of the six measures he evaluates:

1. The coefficient of variation of income X
2. The standard deviation of income power, $z = \ln x$
3. The proportion by which the geometric mean income falls below the arithmetic mean income
4. The proportion by which the harmonic mean income falls below the arithmetic mean income
5. The Gini coefficient of inequality
6. Theil's entropy coefficient of inequality.²⁷

²⁶D. G. Champernowne, op. cit., p. 787.

²⁷Ibid., p. 790.

He found a broad range of response to the three types of inequality. This means that indirect measures of progressivity can be expected to tell very different stories depending upon which measure of dispersion is employed. In practice, the Gini coefficient is typically used.

A third and the most serious problem with the indirect measures involves the fact that changes in the before tax and after tax distribution of income over time may be due to more than one factor. Among these are, the initial distribution of income, changes in the tax laws, changes in relative factor productivity, changes in the age profile of workers, changes in nominal income due to inflation. It is not possible to completely disentangle the effects and determine exactly how each factor influenced progressivity.

Nevertheless, indirect measures are the most satisfactory and are usually employed in tax studies.

Musgrave, in his survey of measures of progressivity, says,

While the various measures of structural progression are merely technical devices which have no economic significance as such, effective progression furnishes a direct measure of the equalizing effects of a tax; and this

after all, is the essence of any progression policy.²⁸

Musgrave adds, however, that effective progression is only an approximation and should be supplemented by other measures "which permit more detailed comparisons."²⁹

In their recent study of the tax burden, Pechman and Okner employ the CGC measure.³⁰ Although it is true that they augment the CGC by examining effective tax rates by population percentile and income class and the distribution of income by population decile, they use only the CGC to measure tax progressivity.

Summary and Conclusion

An analysis of the measures of tax progressivity leads to the conclusion that not one of the measures provides a single coefficient for a tax, satisfies the consistency requirement, and permits detailed and unambiguous interpretation. The best course is to utilize one of the indirect measures such as CGC, or perhaps a general measure such as LSLRP, to reveal the broad sweep

²⁸Musgrave and Thin, "Income Tax Progression, 1929-1948," p. 514.

²⁹Ibid.

³⁰Joseph Pechman and Benjamin Okner, Who Bears the Tax Burden?

of change and to supplement these with a local measure such as RIP, or use the techniques employed by Pechman and Okner, to obtain more detail on the difference between the tax system or given taxes over time.

Chapter III

FORMAL INCIDENCE STUDIES: SELECTION OF THE INCOME BASE AND THE ALLOCATION OF THE TAX BURDEN

Not only are there different measures of tax progressivity, but there are three different income bases against which it can be measured. These are taxable income, adjusted gross income (AGI), and one of several more comprehensive income concepts, such as Pechman and Okner's adjusted family income (AFI). The first measures the progressivity of the legislated rate schedule alone, the other two measure the progressivity of effective rates.

Some recent studies exemplify the use of these three different income bases. D. T. Smith, in his study of the impact of inflation on the progressivity of the federal individual income tax, used taxable income.³¹ In examining the impact of inflation on the progressivity of the federal individual income tax for the period 1944-1975, G. M. von Furstenberg used AGI.³² And

³¹D. T. Smith, "Progressive Income Taxation Discriminates Against Larger Incomes During Inflation," Tax Review 36 (June 1975), pp. 23-28.

³²George von Furstenberg, "Individual Income Taxation and Inflation," National Tax Journal 28 (March 1975), pp. 117-125.

Pechman and Okner in their study of the U. S. tax burden for 1966 used AFI.³³

A close look at the work of Smith and von Furstenberg reveals the different results obtained when different income bases are used to compute tax progressivity. The two authors addressed the same basic question: what is the impact of inflation on the progressivity of the federal individual income tax? However, D. T. Smith used RIP and expressed the tax as a percent of taxable income. G. M. von Furstenberg used LP (actually LSLLP) and expressed the tax as a percent of AGI.

Smith found that, "the progressive income tax in fact is made more progressive by inflation . . ."³⁴ Von Furstenberg, on the other hand, holds that, "since the average tax rates rise by the smallest proportion at the two highest income levels distinguished, liability progression would (given inflation) register a significant decline."³⁵

³³Pechman and Okner, Who Bears the Tax Burden?

³⁴D. T. Smith, "Progressive Income Taxation Discriminates Against Larger Incomes During Inflation," p. 27.

³⁵George von Furstenberg, "Individual Income Taxation," p. 121.

Since Smith and von Furstenberg used different measures of progressivity as well as different income bases, it is not clear whether their different conclusions are explained by the different measures of progressivity or by the different income bases. However, by processing Smith's data using LSLIP (von Furstenberg's measure) and von Furstenberg's data using RIP (Smith's measure) we can determine how sensitive their results are to the measures of progressivity they used. We find that while neither researcher could draw his original conclusion with quite the same force if he had used the other's measure of progressivity, neither would he have to reject his original conclusion. It is their choice of different income bases and not the different measures of progressivity which caused their results to differ. Smith, in using taxable income as the base, is measuring the impact of inflation on the progressivity of the legislated rate structure while von Furstenberg, in choosing AGI as the base, is measuring the impact of inflation on the progressivity not only of the legislated rate structure, but also of exemptions, deductions, allowances, and credits.

While this comparison of the work of D. T. Smith and G. M. von Furstenberg demonstrates the importance of the income base used when measuring tax progressivity

it does not help us determine which income base is best. However, when income redistribution is accepted as the primary reason for progression in a tax policy, it follows that the aim of policy must be a less unequal distribution of income in a broad sense. Even if one considers income from different sources to have different tax bearing capacity, it contradicts the redistributive objective to disregard the distribution of any significant amount of income received by any group in the society.

Support for using a broad concept of income for tax policy analysis comes from R. A. Musgrave. In Public Finance in Theory and Practice, he says, "when examining the degree of income tax progressivity, it is the slope of (the) average rate schedule - also referred to as 'effective rate' - rather than that of the taxable income-based schedule, which must be considered."³⁶ And Pechman and Okner in Who Bears the Tax Burden? also support the use of a broad income concept by measuring the progressivity of effective rates. They state, "relative tax burdens are measured in this study by

³⁶Richard A. Musgrave and Peggy Musgrave, Public Finance in Theory and Practice, p. 220.

comparing effective rates of tax paid by family units."³⁷

Therefore, given the redistributive basis of a progression policy, it is clear that it is the progressivity of the effective rates and not of the rate schedule as defined in the tax legislation that must be measured. To do this a broad income concept is the most appropriate.

Tax-Income Units and Income Groups

Other questions that must be addressed in formal incidence studies concern (1) the classes or groups for which tax and income will be computed or estimated; (2) whether or not to make comparisons using various dichotomies such as renters versus home owners, rural versus urban dwellers, large versus small families, and married couples versus single individuals; and (3) whether to estimate income and tax at hypothetical income levels, or to make estimates of income and tax for actual units for selected income intervals.

Whatever groupings and comparisons are made, some detail is lost. However, it is nevertheless necessary to meet the main objectives of a study given the resources available. Since the main objective of this

³⁷ Joseph Pechman and Benjamin Okner, Who Bears the Tax Burden? p. 18.

study is an analysis of the broad sweep of change over a 15-year period, a detailed treatment of the various dichotomous groupings of income recipients cannot be justified and is not attempted. Also, the estimates of income and tax data are made for actual units for selected income intervals. The intervals chosen are discussed in Chapter IV.

Tax Incidence

Some argue that tax incidence reveals only half the story of government fiscal activity because expenditure policy is as important as tax policy in affecting the welfare of individuals and family units.³⁸ However, in this study, we will analyze only the changes in tax burdens, ignoring the distribution of the benefits of government expenditures. Our main goal is to focus on the changing incidence or burden of our tax system under inflationary conditions.

³⁸For a discussion of expenditure and budget incidence, see Irwin W. Gillespie, "Effect of Public Expenditures on the Distribution of Income;" Richard A. Musgrave, "The Distribution of Government Burdens and Benefits, General Equilibrium Aspects of Incidence Theory;" Richard A. Musgrave, The Theory of Public Finance, pp. 211-17; Richard A. Musgrave and Peggy Musgrave, Public Finance in Theory and Practice, Chap. 15, and, Morgan Reynolds and Eugene Smolensky, Public Expenditures, Taxes, and the Distribution of Income: The United States, 1950, 1961, 1970.

The incidence problem has both a theoretical and a practical aspect in formal incidence studies. One of the foremost theoretical questions raised by both A. R. Prest and C. S. Shoup is the validity of attempting to measure the distribution of the total burden of a tax system.³⁹ Shoup argues that formal incidence studies, "assume what is either untrue or meaningless, namely, that the existing distribution of income-before-tax would remain unaltered if the tax system did not exist."⁴⁰

A. R. Prest further challenges total burden studies on the basis that the incidence of direct and indirect taxes is based on conflicting, and contradictory, assumptions. He holds that assessing the incidence of indirect taxes by assuming the price to increase by the amount of the tax implies a long run analysis. For the price to increase by the full amount of the tax requires a perfectly elastic supply curve. This can only occur in a long run static equilibrium with constant cost industries. Moreover, for direct taxes, on the other hand, it is assumed that the tax has no effect on

³⁹A. R. Prest, "Statistical Calculations of Tax Burdens," Economica 22 (August 1955); Carl S. Shoup, Public Finance, (Chicago: Aldine Publishing Co., 1969).

⁴⁰Carl S. Shoup, Public Finance, p. 11.

relative supply factors or on relative prices. This implies a short run framework because in the long run a tax like the federal individual income tax must have some impact on relative prices.⁴¹

In spite of these serious theoretical problems, both Prest and Shoup indicate the usefulness of formal incidence studies in certain circumstances. Specifically, they hold that these studies have utility when employed to measure changes in the distribution of the tax burden over time⁴² or when taxes are changed.⁴³

The theory of tax incidence is comprised of a plethora of views describing the effects of a tax on the incomes received by producers and the consumption expenditures of individual households. As Pechman and Okner express it, "The burden of a tax on any household is the sum of the burdens borne by its members both as producers and as consumers."⁴⁴ However, in formal incidence studies, a simple framework is generally adopted

⁴¹A. R. Prest, "Statistical Calculations of Tax Burdens."

⁴²Ibid., pp. 244-245.

⁴³Carl S. Shoup, Public Finance, p. 11.

⁴⁴Joseph Pechman and Benjamin Okner, Who Bears the Tax Burden?, p. 27.

by assuming a perfectly competitive long run, with flexible prices, perfect factor mobility, and a fixed supply of labor and savings.

Then within this framework the incidence of five major taxes is estimated including the individual income tax, corporate income tax, sales and excise taxes, property taxes, and payroll taxes. What is remarkable is the consensus that prevails; the swirling theoretical debate raises only minor questions concerning the incidence of these taxes.

The recent work by Pechman and Okner examines eight different sets of incidence assumptions that reflect the spectrum of theoretical positions. The burden and progressivity of the corporate income tax, property tax, and that portion of the payroll tax that falls on employers vary somewhat under the different assumptions but the burden and progressivity of the overall tax structure is not substantially different under any of the eight sets of assumptions.

Therefore, in formal incidence studies examining the broad sweep of change in the long run the theoretical nuances are not critical. The incidence assumptions and allocator series used in this research are discussed in Chapter IV.

Chapter IV

CONCEPTS AND METHODS: MEASURES OF PROGRESSIVITY, TAX INCIDENCE THEORY, INCOME, AND TAX DATA

This chapter presents the basic constructs actually used in the analysis, including methods of measuring tax progressivity, sources of income data, assumptions of tax incidence theory, and the sources of the tax data.

Measures of Tax Progressivity

As described in Chapter II, there is a great deal of confusion among researchers concerning the measurement of tax progressivity. I have chosen least squares logarithmic residual income progression (LSLRP, a general measure) and the changing Gini coefficient (CGC, an indirect measure) to assess the changing progressivity in our tax structure. These measures are selected for a number of reasons:

1. They provide a single coefficient of progression for a tax or the tax structure,
2. They are consistent with the redistributive justification of a progression policy,
3. They are relatively easy to interpret,
4. The CGC measure has been used by other researchers in studying tax burdens and thus it can be used to compare the results of this project with previous

research.⁴⁵

A coefficient of tax progressivity using the CGC method could be obtained by calculating the percent change in the Gini coefficient between the pre-tax and the post-tax distributions of income. This, however, would require knowing for each individual or household total income tax paid, by tax, for each tax for which a coefficient of progressivity is required. This is an impossible task. Even a sample large enough to provide satisfactory confidence levels would present insurmountable costs and problems.

Fortunately, the Gini coefficient can be estimated from aggregate data by plotting the Lorenz curve, measuring the area of inequality, and dividing this area by the area in the lower right portion of the Lorenz diagram (see Figure 9, Chapter II). This is the method used here to compute the before- and after-tax Gini coefficients, and from these a coefficient of progression, P_{cgc} , is computed for each tax and the tax structure for each year. The Lorenz curve is fitted to ten points developed from the ten income classes using a cubic

⁴⁵Joseph A. Pechman and Benjamin A. Okner, Who Bears the Tax Burden? (Washington, D.C.: Brookings Institution, 1974), p. 56.

spleen interpolating function.⁴⁶

The LSLRP coefficient, P_{lslrp} , cannot be calculated from the aggregate data used in computing the CGC coefficient, P_{cgc} . For LSLRP it is necessary to compute the average income before and after tax (residual income) by income class for each tax for each year of the study. Then the base 10 logarithms of income before and after tax (residual income) were computed and a least squares trend line was fitted to the plot of the log of residual income against the log of income. The slope of this estimating equation is the LSLRP of progression,

P_{lslrp} ⁴⁷

⁴⁶This method has been used by Paglin. See Morton Paglin, "The Measurement and Trend of Inequality: A Basic Revision," The American Economic Review, 64, (September 1975), p. 600.

For a basic description of the interpolating function, see Brice Carnahan, et. al., Applied Numerical Methods (New York: John Wiley & Sons, Inc., 1969), p. 63.

A computer program is used to estimate the Lorenz curve, compute the Gini coefficients and the percent change in these Ginis. This program is available on request.

⁴⁷These computations are made in the same computer program in which the CGC is calculated. A listing of the program is available upon request.

The Selection of Income Classes

In this dissertation taxpayers have been grouped using the following income classes:⁴⁸

under \$3,000
\$3,000-4,000
4,000-5,000
5,000-6,000
6,000-7,000
7,000-8,000
8,000-10,000
10,000-15,000
15,000-25,000
25,000 and over

Problems arise with these classes because the major sources of data used do not employ a common set of income classes or intervals.

Most of the data used in this study was drawn from two consumer expenditure surveys conducted by the U. S. Department of Labor, 1960-1961 and 1972-1973, and from

⁴⁸For some purposes taxpayers can also be grouped according to age, marital status, family size, home ownership and geographic locality.

the IRS Statistics of Income.⁴⁹ The income classes of all these data sources are incompatible with each other and with the income classes used in this research. The income classes of the Department of Labor surveys are incompatible with each other because the 1960-61 survey employs a finer breakdown for the lowest income units than the 1972-73 survey. The income classes of both the Department of Labor surveys are incompatible with the income classes used by the IRS and in this dissertation because neither survey develops any breakdown of incomes above \$15,000.

The income classes selected for use in this study have been chosen to minimize cross interval estimating while maintaining reasonable class densities. The selection of the income classes between \$3,000 and \$25,000 results in eight classes, all of which have acceptable class densities and no unmanageable problems of cross interval estimating.

The selection of the two extreme classes, under

⁴⁹U. S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey Series: Diary Data 1972, No. 448-1 (Washington, D.C.: Government Printing Office).

U. S. Department of Internal Revenue, Statistics of Income, Individual Income Tax Returns, annually: 1959-1972 (Washington, D.C.: Government Printing Office).

\$3,000 and over \$25,000, results in classes with high and changing densities which presents problems because: (1) in our society a great deal of interest centers about those receiving very large and very small incomes, (2) within each of these groups there is considerable variation in the way taxpayers are treated, and (3) those receiving the very large and the very small incomes are treated, in some ways, differently from all other taxpayers.⁵⁰

All this could be taken to indicate that too much accuracy is being sacrificed at the extremes. However, the choice of the upper income class, \$25,000 and over, can be justified in that during the early years covered in this study, only one percent of all taxpayers were in

⁵⁰Richard A. Musgrave has demonstrated that (1) low income individuals and households bear a heavy burden relative to those in the middle and upper income ranges and that (2) only for extreme incomes does the rate structure (including all federal, state and local taxes) depart significantly from proportionality, being progressive at both extremes. See R. A. Musgrave, Public Finance in Theory and Practice, (New York: McGraw Hill, 1959), pp. 366-77.

The results of the research done by Pechman and Okner are in agreement with that done by Musgrave in that both find the tax structure departing from proportionality only at the extremes. But Pechman and Okner differ from Musgrave in finding substantial regressivity at the low end, not progressivity. See Pechman and Okner, Who Bears the Tax Burden?, pp. 4-10.

G. M. von Furstenberg has demonstrated that over time there has been significant variation in the effective tax rate paid by low income taxpayers on real

this category and never has the number been greater than five percent.⁵¹

The taxpayers at the low end of the income spectrum are grouped into one class that includes those earning under \$3,000. This classification cannot be justified on the same basis as the \$25,000 and over class because, for the early years covered by the study, 1959-1962, the density of this class is very high with more than one-third of all income units in this category. However, this lumping together of income units below \$3,000 can be justified because (1) a major data source (1972-73 Consumer Expenditure Survey) makes no breakdown below \$3,000 and to estimate for two or more classes below \$3,000 would lead to very unreliable results, (2) the purpose of this study is to reveal the broad pattern of change over a 14-year period, not to examine in detail the changes within one particular income class, (3) in

adjusted gross income. See G. M. von Furstenberg, "Individual Income Taxation and Inflation," National Tax Journal 28 (March 1975), p. 121.

⁵¹This income class interval served the purposes of this study reasonably well. The class density was low during the entire period studied, although it increased from five percent in 1959 to 20 percent in 1972. This increase raises the possibility that the changes within this class during the period were considerable. Future studies may work on extending the data into a breakdown of this class.

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later years covered in the study the percentage of taxpayers in this class falls to about 20 percent of all taxpayers, and (4) estimates of total income before and after tax by population decile are computed to provide some basis to assess the changes occurring within this income class.

Income Data

If one wishes to measure the progressivity of the effective tax rates as opposed to the legislated rates, then a broad, comprehensive income concept is required. A number of recent burden studies that have attempted to measure the progressivity of the effective rates, as opposed to the legislated rates, have been carried out by J. Pechman and B. Okner; R. Musgrave; and B. Okner.⁵² The income totals these researchers developed, especially Pechman and Okner for 1966 and Okner for 1970, are based on the economic concept of income associated with

⁵²Pechman and Okner, Who Bears the Tax Burden?, pp. 12-15; 84-92.

Musgrave, Public Finance in Theory and Practice, pp. 366-77.

Benjamin Okner, "Research on Microdata Files Based on Field Surveys and Tax Returns, 1970 Family Income, Concept and Derivation," Working Paper II, (Washington, D.C.: Brookings Institution, 1975), pp. 5-9.

Henry Simons.⁵³ Individual income is defined as broadly as possible to include the amount of consumption expenditures plus or minus any change in the value of net worth during the period including unrealized items.

In order to adhere to the Simons concept of income, Pechman and Okner adjusted available income data to capture unrealized and non-monetary sources of income. They also made adjustments for various institutional segments of the population that were excluded from a concept of family income.⁵⁴

The present writer does not challenge the concept or definition of adjusted family income (AFI) developed by Pechman and Okner. It is the most appropriate concept to employ in a study of tax burdens and tax progressivity.⁵⁵ However, to make such detailed estimates

⁵³Henry S. Simons, Personal Income Taxation: The Definition of Income as a Problem of Fiscal Policy. (Chicago: University of Chicago Press, 1938), Chap. 2.

⁵⁴Their adjustments, proper as they are, involve complex, subjective estimates and draw on difficult to obtain work sheet files of various government agencies.

⁵⁵Irving Fisher expounded a very different concept of income. Unlike Simons, he saw it as a flow of services, not expenditures. He would not consider saving during a period as income. Nor would he deem the purchase of a piano, for instance, as reflecting income for a single period but rather he would see it as providing services or pleasure for a number of periods. Unfortunately this concept of income has not been employed in

for 14 years goes beyond the time and resources available. Therefore, a readily available, reasonably close approximation of AFI was needed and net national product (NNP) has been chosen. In any case, the closeness between NNP and AFI can be seen by examining the relationship set out in Table 7 between the National Income Account figures and the aggregate income totals developed by the three recent burden studies mentioned above. In no case is the estimated aggregate income figure used in these studies different from NNP by more than five percent and B. Okner's 1970 total AFI is within one percent of NNP.

Selecting or estimating total annual family income was only the first step in a study of this type. It was also necessary to allocate this income among income classes. To accomplish this it was necessary to know or be able to characterize the distribution of income by income class.

There are two readily available sources which describe the distribution of income in the United States during the years of this study. One is found in

any burden studies. See Irving Fisher, The Nature of Capital and Income, (New York: Macmillan Co., 1906), Chaps. 7-10. Also, Richard Goode, The Individual Income Tax, (Washington, D.C.: 1976), Chap. 2.

TABLE 7

TOTAL FAMILY INCOME AND
NATIONAL INCOME ACCOUNT TOTALS
COMPARED FOR SELECTED YEARS
(MONEY AMOUNTS IN BILLIONS)

	1966	1968	1970
Total Family Income	\$ 721 ^a	\$ 772 ^b	\$ 898 ^c
National Income Account Data*			
GNP	750	865	976
NNP	686	791	890
NI	621	713	799

Sources:

*The National Income Account data is from Survey of Current Business, U. S. Department of Commerce, July 1970, July 1974.

^aJoseph Pechman and Benjamin Okner, Who Bears the Tax Burden?, The Brookings Institution, 1974.

^bRichard A. Musgrave and Peggy B. Musgrave, Public Finance in Theory and Practice, McGraw Hill, 1973.

^cBenjamin Okner, "Research on Microdata Files Based on Field Surveys and Tax Returns," The Brookings Institution, July 1975.

Statistics of Income, compiled from a sample of individual income tax returns; the other is found in the Current Population Reports of the Bureau of the Census.⁵⁶

Both sources have serious weaknesses. The IRS data is known to be incomplete regarding low income individuals and families; on the other hand, the census data, being compiled from individual recollections during an interview session, is known to be much less accurate regarding certain standard income sources, such as dividends, interest, and rent, than the IRS data. Also, both the IRS and the Census Bureau compile information on current monetary income only; neither collects data consistent with the broad, Simons type concept of income used in this study. However, short of attempting an independent survey of income distribution, one of these series must be selected and the built-in biases examined to determine their impact on the conclusions of the study.

The IRS data was used here to estimate the

⁵⁶U. S. Department of Internal Revenue, Statistics of Income, Individual Income Tax Returns, 1959-1972, (Washington, D.C.: Government Printing Office).

U. S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-60, No. 101, "Money Income in 1974 of Families and Persons in the U. S." Washington, D.C.: Government Printing Office, 1976).

distribution of income by income class because, even though the Census Bureau data is thought to be more accurate for low income families, the interview method of data gathering raises serious questions concerning accuracy at all income levels.

The IRS data reflects only realized, monetary income. The total income being allocated, however, (actually NNP taken as a proxy for total family income) includes non-monetary and unrealized items as well. The implicit assumption followed here was that non-monetary and unrealized income is distributed among the income classes in the same way as the monetary and realized.⁵⁷

Having selected the IRS data as providing the basis for describing the distribution of income, it was necessary to understand exactly how the basic IRS data was used to allocate the full amount of NNP to the ten income classes.

The first step involved determining the total number of returns (tax-income units) in each income class for each year of the study. Then since the class means were found to be scattered about the class midpoints,

⁵⁷It is important to assess the sensitivity of the results to the errors that the shortcomings of the data will generate.

these midpoints were used as approximations of the class means.⁵⁸ The next step established the amount of income in each class by multiplying the number of taxpayers in each class by the class midpoints. From this the percent income in each class was determined; this in turn was used to allocate all of NNP to the ten income classes.

Incidence Assumptions

Incidence theory is essential to the study of taxes because the burden of a tax must fall on individuals even though each tax is responsible for a myriad of interactive effects, the ultimate impact of which is not always easy to determine.⁵⁹ As difficult as it is to establish the incidence of the direct taxes, those levied and paid by individuals, it can be even more difficult to accomplish this for the indirect taxes, those levied and paid by corporations or other business entities. In addition, any empirical study must contend with the fact that tax data records who pays, not who

⁵⁸This is done to minimize hand calculations and facilitate keypunching.

⁵⁹For a general review of tax incidence theory and four important tax burden studies see Eli Schwartz, "Studies in the Distribution of Tax Burdens by Income Group - A Critique," (Ph.D. dissertation, Brown University, 1952).

bears, a tax.

Although there is much debate surrounding some of the effects of particular taxes, there is a broad consensus concerning who bears the burden of the major taxes. Pechman and Okner examined the variation in the measured burden of the U. S. tax structure under eight different sets of incidence assumptions. They found that different sets of incidence assumptions can lead to different estimates of the burden and the progressivity of the tax structure. This is not surprising.

What is surprising, however, is just how little difference there was under the different sets of assumptions. The fact that the burden and progressivity of our tax system is so relatively insensitive to the shifting assumptions employed made it unnecessary, given the purpose of this study, to examine the different sets of incidence assumptions. It is sufficient to make reasonable incidence assumptions and employ them as effectively as possible, to allocate tax revenue on the basis of the available data.

To develop usable assumptions on final incidence for the purpose of conducting burden and progressivity studies, the basic economic environment was assumed to be perfectly competitive, with flexible prices, perfect factor mobility, and a fixed supply of labor and savings.

These assumptions about the economic environment made possible the useful and workable final incidence assumptions used in this study and set out below.

All personal income taxes were assumed to stay put. Sales and excise taxes were assumed to be borne by consumers of the tax commodities, and all payroll taxes were assumed to be borne by employees.

The property tax was considered in three parts. The portion on commercial property was assumed to be shifted to consumers and was allocated by consumption expenditures. The property tax on residential property was assumed to stay put and was allocated on the basis of housing expenditures made by homeowners and tenants. The property tax on land was assumed to be borne by property income in general.

The corporate income tax was assumed to be borne by the owners of capital and was allocated to families on the basis of reported dividend income.

Table 8 presents a comparison of these incidence assumptions with the most and least progressive sets employed by Pechman and Okner in Who Bears the Tax Burden? The sources of data and the allocation series used will be described in the next section.

TABLE 8
 INCIDENCE ASSUMPTIONS USED IN THIS STUDY
 COMPARED WITH PECHMAN AND OKNER'S MOST PROGRESSIVE AND
 LEAST PROGRESSIVE OPTIONS

Tax and Basis of Allocation	<u>Fries</u>	<u>Pechman & Okner</u>	
		1c (most prog.)	3b (least prog.)
INDIVIDUAL INCOME TAX			
To taxpayers	X	X	X
SALES AND EXCISE TAXES			
To consumption of taxes commodities	X	X	X
PAYROLL TAX ON EMPLOYEES			
To employee compensation	X	X	X
PAYROLL TAX ON EMPLOYERS			
To employee compensation	X	X	
Half to employee comp.; half to consumption			X
PROPERTY TAX ON COMMERCIAL IMPROVEMENTS			
To consumption	X		X
To property income in general		X	
PROPERTY TAX ON RESIDENTIAL IMPROVEMENTS			
To shelter	X		
To property income in general		X	
To consumption			X
PROPERTY TAX ON LAND			
To property income in general	X	X	
To landowners			X
CORPORATION INCOME TAX			
To dividends	X		
Half to dividends; half to property income		X	
Half to property income; half to consumption			X

Tax Data

Total Amounts and Allocation Series

After selecting the taxes and the basic assumptions by which to allocate them, it remained to obtain for each tax the total revenue collected and a series to allocate this revenue to the ten income classes. Table 9 summarizes the basic allocator used for each tax.

The Individual Income Tax

The individual income tax was considered in two parts, (1) the federal individual income tax, and (2) the state and local individual income tax.

Federal

The IRS Statistics of Income contains annually a detailed analysis of the federal individual income tax which is based on a sample of all returns filed during the tax year. For each year covered in this study, the total federal individual income tax by income class was taken directly from this IRS publication.

There was one minor problem encountered in using the Statistics of Income data. For four of the 14 years (1964-1967) the IRS \$20,000-\$50,000 income class straddles the \$15,000-\$25,000 and the \$25,000 and over classes of this study. To overcome this problem, the families and income of the IRS \$20,000-\$50,000 class were divided in half, one half going to the

TABLE 9

ALLOCATORS USED IN THIS STUDY TO DISTRIBUTE
THE TOTAL AMOUNT OF EACH TAX TO INCOME CLASSES

Tax	Allocator	Source
INDIVIDUAL INCOME TAX		
Federal	Tax payments	<u>Statistics of Income</u>
State and Local	Mean Effective Rates	ACIR
SALES AND EXCISE TAX		
Alcohol	Expenditures on Alcohol	Expenditure Survey (60/61)
Tobacco	Expenditures on Tobacco	Expenditure Survey (60/61)
Other	Consumption Expenditures	Expenditure Survey (71/72)
PAYROLL TAX		
	Covered Wages and Salaries	<u>Statistics of Income</u> <u>Payroll Tax for Social Security</u>
PROPERTY TAX		
Commercial Improvements	Consumption Expenditures	Expenditure Survey (71/72)
Residential Improvements	Owners's/Renter's Expenditures	Expenditure Survey (60/61)
Land	Property Income (Dividends, Interest, Rent, and Royalties)	<u>Statistics of Income</u>
CORPORATION INCOME TAX	Corporate Ownership (Dividends)	<u>Statistics of Income</u>

\$15,000-\$25,000 class, the other to the \$25,000 and over class.

State and Local

In allocating state and local individual income taxes it was assumed that the mean effective rate by income class for all individual income taxes levied at the local level was the same as the mean effective rate by income class for all individual income taxes levied at the state level. It was also assumed that the mean effective rate schedule for the state individual income tax was constant during the period 1959-1972. The basis for this assumption is set out in Table 10 where it can be seen, for example, that between 1963 and 1971 the mean effective rate for the \$7,500 income class was constant at 1.2 percent. While some variation is seen for the other income classes, it never exceeds four-tenths of one percent between 1963 and 1971.

The income classes for which the Advisory Commission on Intergovernmental Relations (ACIR) reported effective rates are not the same as the income classes adopted in this study. To obtain effective rates for the income classes of this study from the ACIR data, the ACIR data was plotted as shown in Figure 11 and a parabola fitted to the points using the least squares technique. The estimating equation obtained was used to

TABLE 10
EFFECTIVE MEDIAN RATES
STATE INCOME TAX
ALL STATES
SELECTED YEARS

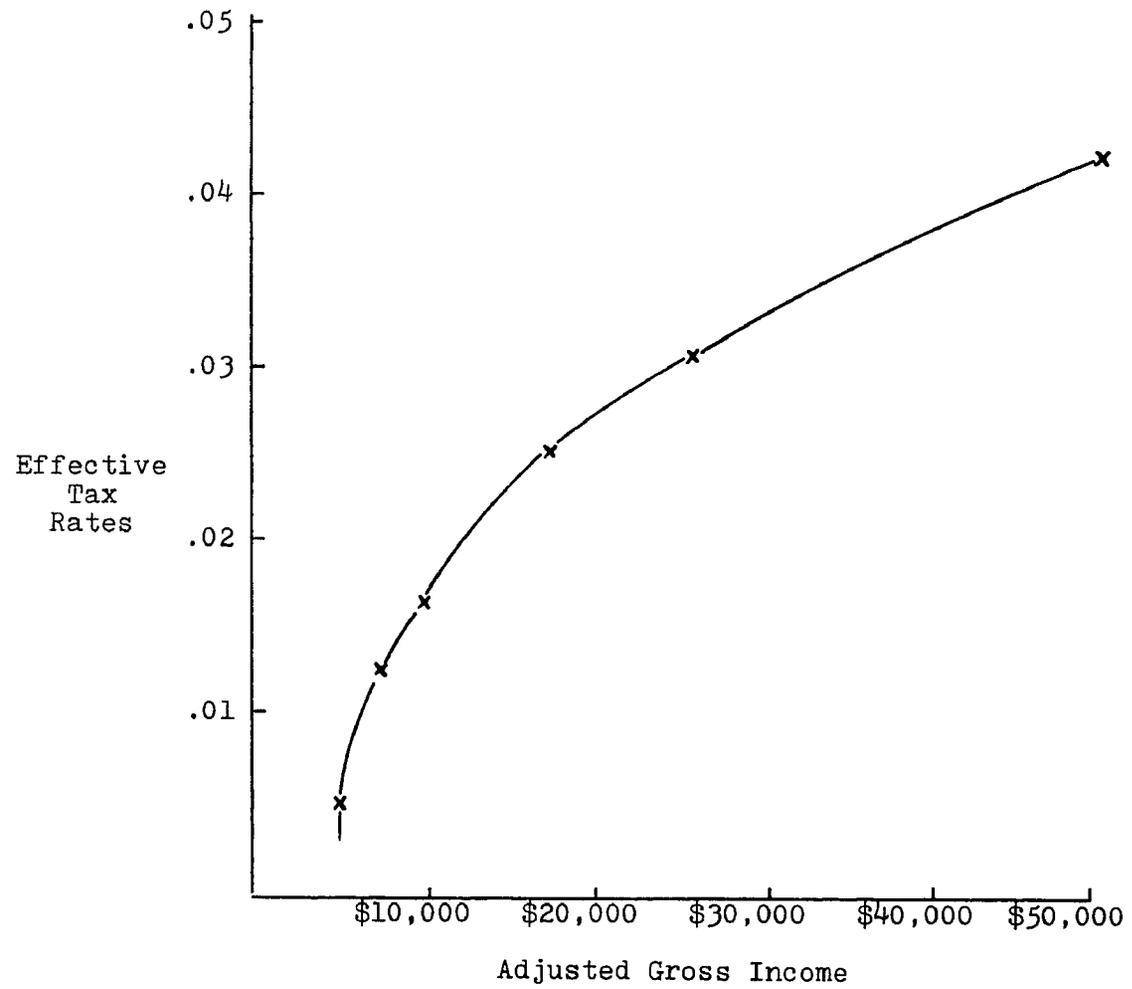
Year	Income Classes					
	\$5,000	\$7,500	\$10,000	\$17,500	\$25,000	\$50,000
1953	.4	.8	1.3		2.5	
1963	.6	1.2	1.6		2.8	
1968	.5	1.2	1.7	2.5	3.2	
1971	.5	1.2	1.6	2.4	3.2	4.2
1974	.3	1.1	1.5	2.1	3.0	3.9

Sources: Advisory Commission on Intergovernmental (ACIR) Relations. State and Local Finances: Significant Features 1966-1969, A report prepared by the Advisory Commission on Intergovernmental Relations, p. 74, Washington, November 1968.

ACIR. Federal-State-Local Finances: Significant Features of Fiscal Federalism, A report prepared by the ACIR, p. 260, Washington, February 1974.

ACIR. Federal-State-Local Finances: Significant Features of Fiscal Federalism, A report prepared by the ACIR, p. 30, Washington, November 1975.

Figure 11 EFFECTIVE RATE CURVE, STATE PERSONAL INCOME TAX
(MEAN, ALL STATES)



establish the effective rates for the median incomes of the ten income classes. These effective rates are shown in Table 11.

The total state and local personal income tax revenue was taken from the National Income Account data as published annually (with several exceptions) in the July issue of the Survey of Current Business.⁶⁰

The allocation was accomplished by computing, for each year, the product of each class midpoint, effective tax rate on the midpoint income, and the number of families in the income class during the tax year. From this proxy series the percent tax in each class for each year was computed and these percentages were used to allocate the total amount of state and local individual income tax revenue recorded in the National Income Accounts. Table 12 shows the allocation of state and local individual income tax for 1959.

The Corporate Income Tax

The total amount of federal and state corporate income tax allocated to the various income classes in this study was developed from the amount reported annually in the national income accounts. As pointed out

⁶⁰U. S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, 54 (Washington, D.C.: Government Printing Office, July 1974).

TABLE 11
 ESTIMATED EFFECTIVE TAX RATES FOR MEAN
 STATE PERSONAL INCOME TAX
 BY INCOME CLASS

<u>Income Class</u>	<u>Estimated Effective Rate (Least Squares)</u>
below 3,000	0.00%
3,000-4,000	.355
4,000-5,000	.536
5,000-6,000	.712
6,000-7,000	.885
7,000-8,000	1.053
8,000-10,000	1.296
10,000-15,000	1.826
15,000-25,000	2.779
25,000 and up	4.125

TABLE 12

ALLOCATION OF STATE AND LOCAL PERSONAL INCOME TAX FOR 1959
ACCORDING TO EFFECTIVE RATE SCHEDULE DERIVED FROM ACIR DATA

	(1)	(2) ^a	(3)	(4) [*] (2) [*] (3)	(5)	(6)
Income Class	Class Midpoint	Effective Rate	Number Families (millions)	"Amount Tax" (millions)	"% Tax"	Amount Tax (millions)
under \$3,000	\$ 1,500	0.0%	21,384	\$ 0	0.00%	\$ 0
3,000-4,000	3,500	.1	7,008	24,528	.62	13,349
4,000-5,000	4,500	.3	7,128	96,288	2.42	52,103
5,000-6,000	5,500	.6	6,409	211,497	5.31	114,324
6,000-7,000	6,500	.9	5,092	297,882	7.48	161,044
7,000-8,000	7,500	1.2	3,714	334,260	8.39	180,637
8,000-10,000	9,000	1.5	4,373	590,355	14.81	318,859
10,000-15,000	12,500	1.9	3,175	754,063	18.92	407,348
15,000-25,000	20,000	2.6	1,018	529,360	13.28	285,918
25,000 and up	47,859	4.0	599	1,146,702	28.77	619,418
Totals			59,900	\$3,984,875	100.00%	\$2,153,000

^aSource: Table 11, p. 92.

above, the corporate income tax was assumed to be borne by the owners of capital. But households do not own all corporate capital; some is owned by institutions. Therefore, in allocating this tax to households it was necessary to adjust the total collected to reflect the fact that households own only a portion of all corporate capital. This share was assumed to be constant over the period of the study and to be approximately 75 percent of the total.⁶¹ The amount of federal and state corporate income tax allocated to households then, is 75 percent of the amount recorded in the national income accounts.⁶²

After establishing the total amount of federal and state corporate income tax that it was appropriate to allocate, and having decided that this tax was borne by owners of capital, i.e., that it was not shifted to property owners in general, nor passed on to consumers

⁶¹The division of corporate ownership shares, 75% to households and 25% to the non-household population, is an approximation taken from Pechman and Okner, Who Bears the Tax Burden? p. 96.

⁶²This 75-25 division of corporate ownership between individual households and institutions is used to estimate what portion of total corporate income taxes paid should be allocated to individuals. While the portion allocated to institutions ultimately is borne by individuals there is no reliable basis for allocating it to them and it is not included.

in any significant way, it was necessary to establish a way to estimate for each income class, its relative share in the ownership of capital. This was done by using dividend income as reported in Statistics of Income as a proxy for the ownership of capital. The total amount of federal and state corporate income tax (actually 75 percent of the national income accounts figure) was allocated to the various income classes in proportion to the dividend income reported by that group to the IRS.

Sales and Excise Taxes

Sales and excise taxes were disaggregated into three categories, alcohol, tobacco, and all other. Three different proxy series were used to allocate these different categories of tax. As with all taxes in this study (except for the federal individual income tax) the total amount of tax in each category was taken from the National Income Accounts. In the National Income Accounts the total tax collected for alcoholic beverages and tobacco products was reported separately. The sum of these two taxes was subtracted from all sales and excise taxes collected and this residual was allocated as the all-other category.

The three different allocation series for these three taxes came from two different sources, the 1960-61

and the 1972-73 consumer expenditure surveys conducted by the U. S. Department of Labor. The 1960-61 survey reported expenditures for alcoholic beverages and tobacco by income class; these two series were used to allocate total tax figures for alcoholic beverages and tobacco by income class. The 1972-73 survey reports consumer expenditures by income class; this series was used to allocate all other sales and excise taxes.

Although the two surveys provided the basic allocation data, neither survey provided all the data in a format compatible with the needs of this research. One problem presented by both surveys was that they were compiled from interviews and questionnaires conducted during one year or period and for purposes of this research, it was necessary to have an allocation series for each of the 14 years studied.

Another problem, encountered only with the 1960-61 survey, was that the income classes are different from the classes used here. Therefore, several transformations were required to obtain allocation series for each year studied and by income classes compatible with the income classes of this research. In order to assess the way sales and excise taxes were allocated, it is important to understand how these problems were resolved.

The first problem, of obtaining from the survey

year data an expenditure series for each of the 14 years studied, was resolved in the same way for both surveys. Two assumptions were needed. First, it was assumed that the CPI accurately reflects changes in the purchasing power of money, and second, that the average propensity to consume (APC) out of real income was constant over the period of the study and the same as in the survey or base year. The APC by income class during the survey year was defined as the ratio of the average dollar amount of consumer expenditures by income class over the income class midpoint income. Table 13, column 5 shows the base year APC for tobacco expenditures.

The next step involved using the CPI to express the income class midpoints for each year of the study in survey or base year dollars; 1961 was used as the base for the 1960-61 survey and 1972 for the 1972-73 survey. Then using these adjusted class midpoints (shown in Table 13, column 4 for 1962), base year APC (shown in Table 13, column 5), and simple linear interpolation, an APC out of real income was computed for each income class for each year of the study. For example, the 1962 APC (shown in Table 13, column 6) for the \$4,000-\$5,000 income class is .02079. This was computed as follows:

TABLE 13

PROCEDURE TO OBTAIN AVERAGE EXPENDITURES FOR TOBACCO BY
 INCOME CLASS FOR 1962 FROM AVERAGE EXPENDITURES
 FOR TOBACCO, REPORTED IN 1961 SURVEY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	1961	1961	1962	(3)*.98896	(2)/(1)	1962 APC on	(4)*(6)
Income Class	Class	Tobacco	Class	Class	Base	Mid-Class	1962
	Midpoint	Expend.	Midpoint	Midpoint	Year	Income by	Tobacco
				1961 \$	APC	Interpol.	Expend.
under \$3,000	\$ 1,500	\$ 44.31	\$ 1,500	\$ 1,483	.02950	.02973	\$ 44.09
3,000-4,000	3,500	79.23	3,500	3,461	.02260	.02273	78.67
4,000-5,000	4,500	93.47	4,500	4,450	.02070	.02079	92.52
5,000-6,000	5,500	102.88	5,500*	5,439	.01870	.01882	102.36
6,000-7,000	6,500	112.00	6,500	6,428	.01720	.01731	111.27
7,000-8,000	7,500	120.00	7,500	7,417	.01600	.01610	119.41
8,000-10,000	9,000	125.00	9,000	8,901	.01390	.01404	124.97
10,000-15,000	12,500	120.63	12,500	12,362	.00970	.00987	122.01
15,000-25,000	20,000	131.00	20,000	19,779	.00655	.00665	131.53
25,000 up	47,144	156.59	45,755	45,250	.00332	.00352	161.06

$$.02260 - \left[\frac{\$4,450 - \$3,500}{\$4,500 - \$3,500} \right] * [.02070 - .02260] = .02079$$

Finally, from these APC figures computed for each income class for each year and the income class mid-points, expressed in base year dollars, a level of expenditure was computed in current dollars for each income class for each year of the study. This computation for the \$4,000-\$5,000 income class for 1962 was:

$$\$4,450 * .02079 = \$92.52$$

This result is shown in Table 13, column 7 for the \$4,000-\$5,000 income class. These procedures were used with both the 1960-61 and the 1972-73 surveys to obtain allocation series for alcoholic beverages, tobacco, and general consumption expenditures for all 14 years studied.

The other problem, presented only by the 1960-61 survey, involved adjusting the survey data to be consistent with the income classes of this dissertation. The 1960-61 survey divided the income range between \$6,000 and \$10,000 into two classes, \$6,000-\$7,499 and \$7,500-\$9,999. This study divided this range, \$6,000-\$10,000, into three classes: \$6,000-\$7,000; \$7,000-\$8,000; \$8,000-\$10,000. Also, the highest income class in the 1960-61 survey was \$15,000 and up. For this study incomes above \$15,000 were divided into two

classes, \$15,000-\$25,000 and \$25,000 and up.

The expenditure series for four of the five income classes for which there was an incompatibility were adapted in one way, the \$25,000 and up class was handled differently.

For the classes other than the top one, each expenditure series was plotted against income using the average expenditure and class midpoint (for the \$15,000 and up class of the survey the average expenditure was plotted against average income not the class midpoint). The plot for tobacco expenditures is shown in Figure 12. A similar plot was made for alcoholic beverages. The average expenditure figures for the classes of this study were established from this plot by linear interpolation. For example, Table 14 shows the estimated average expenditure for tobacco in the \$6,000-\$7,000 income class to be \$112.46. This was obtained from the survey data in the following way:

$$\$102.88 + \left[\frac{\$6,750 - \$5,500}{\$6,500 - \$5,500} \right] * [\$114.85 - \$102.88] = \$112.46$$

The survey series for alcoholic beverages was transformed according to this same procedure. Table 14 shows the relationship between the survey and the modified series.

The average expenditure for alcohol and the average expenditure for tobacco made in the \$25,000 and up class

FIGURE 12

AVERAGE EXPENDITURE FOR TOBACCO FROM 1961 SURVEY
PLOTTED AGAINST INCOME CLASS MIDPOINTS TO OBTAIN
MODIFIED TOBACCO EXPENDITURE SERIES

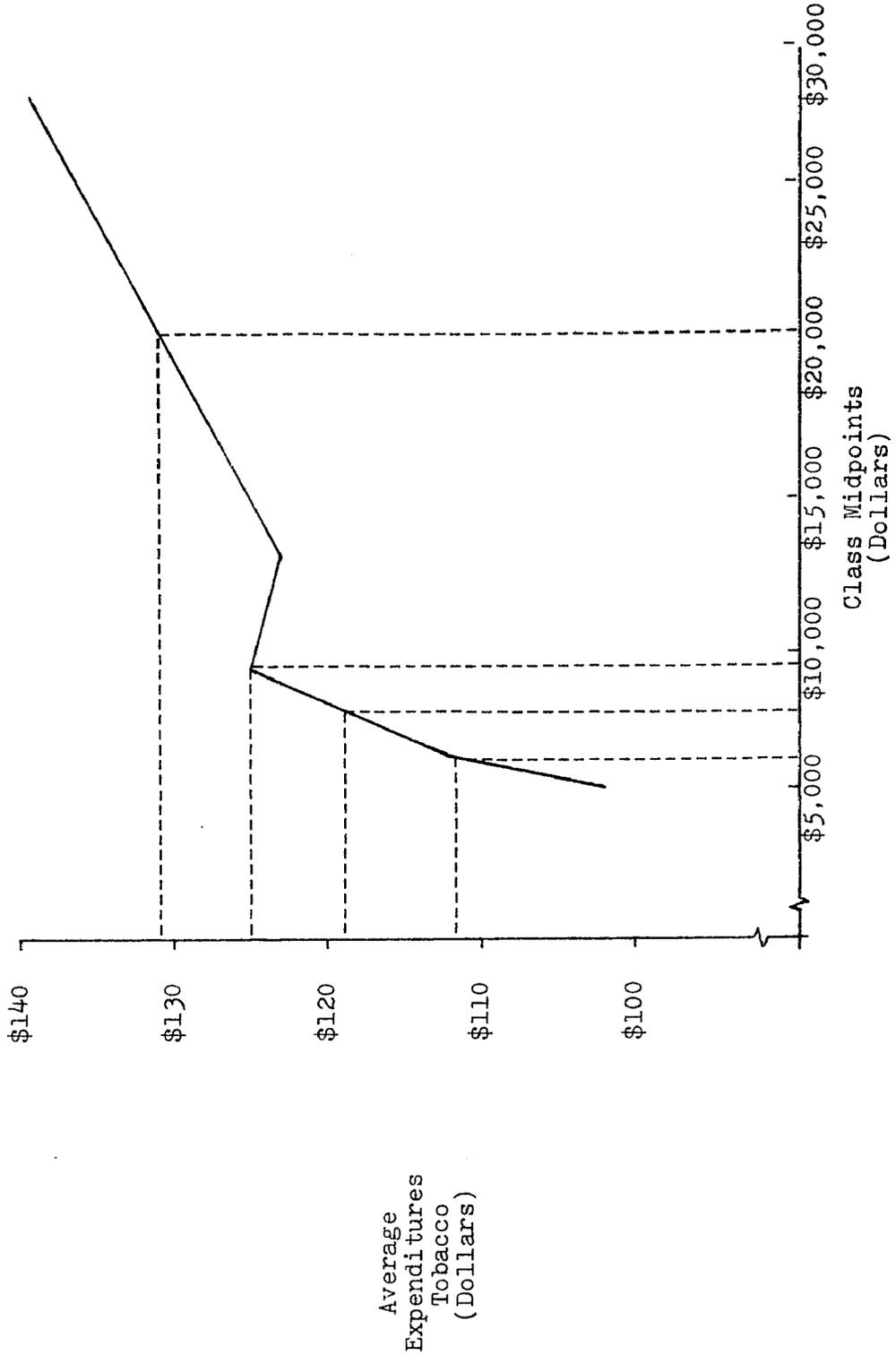


TABLE 14

RELATIONSHIP FOR 1961 SURVEY BETWEEN UNMODIFIED AND
MODIFIED EXPENDITURE SERIES FOR ALCOHOLIC BEVERAGES AND TOBACCO

Income Class	Unmodified Survey Data		Modified Survey Series		
	Average Expenditure Alcohol	Average Expenditure Tobacco	Income Class	Average Expenditure Alcohol	Average Expenditure Tobacco
under \$3,000	\$ 20.90	\$ 44.31	under \$3,000	\$ 20.90	\$ 44.31
3,000-4,000	49.46	79.23	3,000-4,000	49.46	79.23
4,000-5,000	66.55	93.47	4,000-5,000	66.55	93.47
5,000-6,000	76.30	102.88	5,000-6,000	76.30	102.88
6,000-7,500	100.07	114.85	6,000-7,500	95.32	112.46
7,500-10,000	121.22	125.14	7,000-8,000	108.00	118.71
			8,000-10,000	124.65	125.04
			10,000-15,000	172.61	120.63
			15,000-25,000	215.14	131.50
			25,000 and up	345.13	155.55

were residuals defined in the following way. For the top survey class of \$15,000 and up total expenditures in both series were computed by multiplying the number of families in the class by the average expenditure in the class. Then from the interpolation procedure described above, the average expenditure in the \$15,000-\$25,000 income class for each series was estimated and from this the total expenditure made by families in this class was derived. Next, for both series the total expenditure in the \$25,000 and up class was obtained by subtracting the total expenditures in the \$15,000-\$25,000 income class from the total expenditures in the \$15,000 and up class. Finally, the average expenditure in the \$25,000 and up class was computed by dividing the total expenditures in this class by the number of families.

In addition, estimates of the number of families in the \$15,000-\$25,000 and \$25,000 and up classes were needed to compute the modified series. The data was obtained from 1961 Statistics of Income. For 1961 the IRS reported 1,883,639 families with an adjusted gross income (AGI) of \$15,000 and up. Of this total, 1,246,842 or 66.2 percent had an AGI between \$15,000 and \$25,000 and 636,797 or 33.8 percent had an AGI of \$25,000 and up. Applying these percentages to the 1,118

families reported by the survey with incomes of \$15,000 and up gave 740 families in the \$15,000-\$25,000 class and 378 in the \$25,000 and up class.

The average expenditure for tobacco in the \$25,000 and up class, shown in Table 14 as \$155.55 was computed in the following way:

(1) Total expenditures \$15,000 and up (1,118 * \$139.63)	\$156,106.34
(2) Total expenditures \$15,000-\$25,000 (740 * \$131.50)	<u>97,310.00</u>
(3) Total expenditures \$25,000 and up ((1) - (2))	58,796.34
(4) Average expenditure \$25,000 and up ((3) / 378)	<u><u>155.55</u></u>

Table 14 also shows the two modified series for alcoholic beverages and tobacco expenditures for the survey year from which a series was developed for each year of the study using the procedure described earlier in this chapter. These modified and expanded series were used to allocate sales and excise tax revenue.

Property Taxes

The property tax was divided into three parts: the tax on land, on commercial property, and on residential property. The disaggregation was made on the assumption that the proportion of all property taxes paid on the three types of property - land, commercial property and residential property - was constant over the period of

the study.

Table 15 summarizes the information drawn upon to justify this assumption. From this table, it can be seen that the gross assessed value by type of property was constant over the period; with just over 25 percent of gross assessed value of taxable real property being commercial, 60 percent residential, and 11 percent land.⁶³

The total property tax revenue collected each year was taken from the National Income Accounts reported in the Survey of Current Business. It was divided into three parts, 29 percent for commercial, 60 percent for residential, and 11 percent for land. The adjustments were made in order to allocate all property tax revenues to households.

An allocation series was developed for each

⁶³These percentages were taken from publications of the Advisory Commission on Intergovernmental Relations (see Sources, Table 12). The advantage of this source is the availability of data for the period studied, but a problem exists in that for residential and commercial property, land and improvements are lumped together. Since these percentages are used to estimate the total tax revenue from land, commercial, and residential property, the tax from land is understated and the tax on residential and commercial property is overstated. The distortion created by using these percentages to estimate property tax revenue by type of property is small and does not have a material impact on the results of this study.

TABLE 15

PROPERTY TAX DATA SELECTED YEARS
PERCENT DISTRIBUTION OF GROSS
ASSESSED VALUES, BY TYPE OF PROPERTY

Year	Type of Property		
	Commercial	Residential	Land
1961	26.6	57.9	11.6
1966	25.0	60.0	11.0
1971	NA	58.4	NA

Source: Advisory Commission on Intergovernmental Relations. Federal-State-Local Finances: Significant Features of Fiscal Federalism, A report prepared by the ACIR, p. 168, Washington, February 1974.

U. S. Department of Commerce. Census of Governments: 1962, Taxable Property Values, A report prepared by the Bureau of the Census under the supervision of Allen D. Manvel, vol. II, p. 34, Washington 1962.

U. S. Department of Commerce. Census of Governments: 1972, Taxable Property Values, vol. 2, part 1, p. 8, Washington 1973.

Note: Years do not add to 100% due to omitting vacant lots and rounding.

The Census of Governments: 1972 reported gross assessed value of taxable real property for Standard Metropolitan Statistical Areas, not for states nationwide. This makes the data collected in 1972 incompatible with earlier censuses.

category of the property tax consistent with the assumptions discussed above. The series developed to allocate the portion of the property tax falling on land, which was allocated on the basis of property income in general, was the sum of dividend, interest, rent, and royalty income reported in Statistics of Income.

The portion of property tax falling on commercial improvements was assumed to be borne by consumers in proportion to their consumption expenditures. Therefore, this portion of the property tax was allocated using the same consumer expenditure series used to allocate all sales and excise taxes except alcohol and tobacco.

Finally, the portion of the property tax falling on residential property was assumed to be borne by home owners and those who rent houses and apartments. The allocation series for this portion of the property tax was developed from two expenditure series reported in the 1960-61 consumer expenditure survey; the rented dwelling total (RDT) and the owned dwelling total (ODT). The rented dwelling series was to approximate the expenditures made by those who rent homes and apartments. The owned dwelling series served as a proxy for imputed rent. The same procedures were used to adapt the income classes of the rented dwelling and owned dwelling series

and to obtain a series for each of the 14 years of the study as were employed in carrying out these same transformations on the alcoholic beverages and tobacco series. Table 16 sets out for the rented dwelling and owned dwelling series the relationship between the survey and the modified series developed to allocate the portion of the property tax falling on residential property.

The ODT and RDT were the bases of the allocation series for the property tax on residential property. They were weighted by the split in the population between owners and renters of dwelling space in each income class. The percentages or weights were derived from the 1960-61 and 1972-73 consumer expenditure surveys. Since the owner/renter split by income class was relatively constant during the period 1959-1972, the percentages from the two series were averaged and adjusted to 100 percent.

For example, for the under \$3,000 income class, the 1960-61 survey indicates 50 percent renters and 48 percent owners while the 1972-73 survey indicates 48 percent renters and 41 percent owners. First, the percent renting from the two surveys (50 percent and 48 percent) were averaged giving 49 percent and the percent owning from the two surveys (48 percent and 41 percent) were averaged giving 45 percent. Then these two averages

TABLE 16
 RELATIONSHIP FOR 1961 SURVEY BETWEEN UNMODIFIED AND
 MODIFIED EXPENDITURE SERIES FOR RENTERS AND OWNERS OF DWELLING SPACE

	Unmodified Survey Data		Modified Survey Data	
under \$3,000	\$231.07	\$ 113.15	under \$3,000	\$231.07
3,000-4,000	310.72	170.32	3,000-4,000	310.72
4,000-5,000	327.65	221.99	4,000-5,000	327.65
5,000-6,000	306.19	337.68	5,000-6,000	306.19
			6,000-7,000	254.00
6,000-7,500	244.48	491.26	7,000-8,000	244.50
7,500-10,000	244.50	586.66	8,000-10,000	240.00
10,000-15,000	218.90	760.58	10,000-15,000	218.90
			15,000-25,000	224.00
15,000 and up	230.06	1,206.17	25,000 and up	241.97
				1,690.02

(49 percent renting and 45 percent owning) were adjusted to 100 percent. This adjustment gives 52 percent renters and 48 percent owners for the under \$3,000 income class. These weighting factors for all income classes are shown in Table 17, columns 2 and 4. This same table is useful in following the development of the shelter total (ST). The RDT (column 1) was weighted by the percent population renters (column 2) giving adjusted rent expense (column 5). Next, the ODT (column 3) was weighted similarly by applying the percent population owners (column 4) giving adjusted owners expense (column 6). Finally, the arithmetic sum of these adjusted series by income class gave the ST in column 7. This was used to allocate the property tax on residential property.

Payroll Taxes

Payroll deductions for social security, health, and disability programs are considered by some to be taxes, by others to be compulsory insurance premiums (imputed saving). If treated as taxes, they are very regressive because there are no exemptions and income above a continuously rising maximum is excluded. The result is that the greatest burden falls on the lowest income workers.

On the other hand, the framers of the system emphasized the insurance aspects of the program, pointing out that workers were contributing to a fund from which they

TABLE 17

AVERAGE SHELTER EXPENDITURE BY INCOME CLASS,
DERIVED FROM 1961 EXPENDITURE SURVEY

Income Class	(1) Average Rent Expense	(2) Percent Population Renters	(3) Average Owners Expense	(4) Percent Population Owners	(5) (1)*(2) Adjusted Rent	(6) (3)*(4) Adjusted Owners	(7) (5)+(6) Shelter Total
under \$3,000	\$231.07	52%	\$ 113.15	48%	\$120.16	\$ 54.31	\$ 174.47
3,000-4,000	310.72	52	170.32	48	161.57	81.75	243.32
4,000-5,000	327.65	51	221.99	49	167.10	108.78	275.88
5,000-6,000	306.19	46	337.68	54	140.85	182.35	323.20
6,000-7,000	254.00	40	465.00	60	101.60	279.00	380.60
7,000-8,000	244.50	36	533.00	64	88.02	341.12	429.14
8,000-10,000	240.00	33	615.00	67	79.20	412.05	491.25
10,000-15,000	218.90	25	760.58	75	54.73	570.44	625.17
15,000-25,000	224.00	18	960.00	82	40.32	787.20	827.52
25,000 and up	241.97	7	1,690.02	93	16.94	1,571.72	1,588.66

would receive benefits during some future time. However, the problem with this latter view is that in a strict sense the system is not an insurance system at all because many individuals receive more in benefits (many less) than they paid in for reasons other than those related to probability. In short, the system is not on a strict actuarial basis. Therefore, in this study, the payroll deductions for social security, health, and disability programs were considered to be taxes. The employee and employer portions were combined and allocated to income classes as one tax. The total amount of tax collected in this category was taken from the National Income Accounts. The federal and state revenues were combined.

The combined federal and state payroll taxes were allocated to the income classes of this study according to a series developed from three primary sources: the IRS Statistics of Income; a Brookings publication entitled, The Payroll Tax for Social Security, J. S. Brittain; and the Social Security Bulletin, Annual Statistical Supplement, 1967.

The first step in developing the series used to allocate the payroll tax, and referred to here as covered wages and salaries (CWS), was to take from Statistics of Income a series called wages and salaries.

This series was developed by income class for each year of the study. Then from the other source cited above, the maximum income subject to payroll taxes was obtained; for 1965 this was \$4,800 (see Table 18, column 2). Then, using ceiling income and the income class midpoints, 14 sets of adjustment ratios (one set for each year of this study) were developed. The series for 1965 is shown in Table 18, column 3. These ratios estimate the percent of wages and salaries in each income class to which the payroll tax is applied. The ratios were established by using the maximum or ceiling income as the numerator and the class midpoint as the denominator. The ratio, of course, cannot exceed one in that a tax can only be levied on wages and salaries paid. So for the lower income classes when the class midpoint, the assumed mean income of the class, was less than the maximum or ceiling income, the total amount of wages and salaries received by that class was assumed to be covered or subject to the payroll tax. For example, in 1965 the maximum or ceiling income was \$4,800 which was greater than the class midpoints for 3 of the 10 income classes and the adjustment ratios for these three income classes would be 1.0000 as shown in Table 18, column 3.

These adjustment ratios, one set for each year,

TABLE 18
 THE 1965 ADJUSTMENT RATIOS TO
 DERIVE CWS FROM W&S

Income Class	(1) Class Mid- point	(2) Ceiling* Income	(3) Adjustment Ratio
under \$3,000	\$ 1,500	\$4,800	1.0000
3,000-4,000	3,500	4,800	1.0000
4,000-5,000	4,500	4,800	1.0000
5,000-6,000	5,500	4,800	.8727**
6,000-7,000	6,500	4,800	.7385
7,000-8,000	7,500	4,800	.6400
8,000-10,000	9,000	4,800	.5333
10,000-15,000	12,500	4,800	.3840
15,000-25,000	20,000	4,800	.2400
25,000 and up	44,763	4,800	.1072

*John A. Brittain, The Payroll Tax for Social Security, The Brookings Institution, Washington, 1972, p. 270.

**4800/5500 = .8727.

were applied to the wages and salary series from Statistics of Income to obtain the covered wages and salaries (CWS) series that was used to allocate payroll taxes.

Chapter V

TAX PROGRESSIVITY AND THE DISTRIBUTION OF INCOME 1959-1972

This chapter describes the results of the calculations based on the methodology set out in Chapters III and IV. The changing progressivity of the (1) federal individual income tax, (2) state and local individual income taxes, (3) corporate income taxes (federal and state combined), (4) sales and excise taxes, (5) property taxes, (6) payroll taxes, and (7) the overall tax structure are examined. The impact of this changing progressivity on the distribution of after-tax income is also presented. The causes of this changing progressivity are evaluated in Chapter VI.

Tax Progressivity 1959-1972

Two different measures were employed to assess the changing progressivity, least squares logarithmic residual income progression (LSLRP) and the changing Gini coefficient (CGC). Both measures were used because they complement each other in evaluating changes in tax progressivity. These measures were discussed in Chapter II.

Table 19 presents the LSLRP coefficients for the six major tax groups and the overall tax structure. In reading Table 19, a coefficient of less than one

TABLE 19
 LEAST SQUARES LOGARITHMIC RESIDUAL INCOME
 PROGRESSION BY TAX FOR THE PERIOD
 1959-1972

Year	Federal Individual Income Tax	State and Local Individual Income Taxes	Federal and State Corporate Income Tax	Sales and Excise Taxes	Property Taxes	Payroll Taxes	Tax Structure
1959	.947	.995	.936	1.02	1.01	1.03	.918
1960	.943	.994	.936	1.02	1.01	1.03	.908
1961	.942	.994	.942	1.03	1.01	1.03	.917
1962	.947	.994	.948	1.03	1.01	1.03	.937
1963	.948	.994	.951	1.03	1.01	1.03	.945
1964	.951	.994	.948	1.03	1.01	1.03	.950
1965	.950	.994	.949	1.03	1.01	1.03	.952
1966	.949	.994	.950	1.03	1.01	1.03	.945
1967	.949	.993	.964	1.03	1.02	1.03	.972
1968	.949	.993	.961	1.03	1.02	1.03	.971
1969	.949	.992	.967	1.03	1.02	1.03	.985
1970	.952	.992	.977	1.03	1.02	1.03	1.013
1971	.952	.992	.979	1.04	1.02	1.03	1.021
1972	.951	.990	.982	1.04	1.02	1.04	1.026

indicates a progressive tax, equal to one a proportional tax, and greater than one a regressive tax.

This table shows that the two taxes, the federal individual income tax and the federal/state corporate income taxes, which were the most progressive at the beginning of the period, were still the most progressive at the end of the period although the progressivity of both had declined.

The only other taxes which had a progressive impact were the state and local individual income taxes. The progressivity of these increased slightly during the period.

The LSLRP coefficients of the sales and excise taxes, the property taxes, and the payroll tax were regressive. The LSLRP coefficients for these taxes were constant during the period. We can thus assume that these taxes had little or no impact on the changing progressivity of the overall tax structure during the period. LSLRP reveals that the progressivity of the overall tax structure declined over the period and in the 1970's was actually regressive.

The CGC reveals a similar pattern of change in progressivity between 1959 and 1972. Table 20 presents for the six taxes discussed above and the tax structure, the CGC for each year, 1959-1972. In reading Table 20, a

TABLE 20
 PERCENT CHANGE IN GINI COEFFICIENT
 BY TAX FOR THE PERIOD
 1959-1972

Year	Federal Individual Income Tax	State and Local Individual Income Taxes	Federal and State Corporate Income Tax	Sales and Excise Taxes	Property Taxes	Payroll Taxes	Tax Structure
1959	-4.04	-.417	-3.34	2.37	1.15	2.68	-1.90
1960	-3.95	-.494	-2.96	2.47	1.21	2.41	-1.56
1961	-4.09	-.472	-2.92	2.46	1.27	2.42	-1.57
1962	-3.78	-.487	-2.63	2.47	1.31	2.41	-.76
1963	-3.72	-.473	-2.57	2.49	1.30	2.50	-.45
1964	-3.66	-.488	-2.78	2.41	1.30	2.56	-.73
1965	-3.59	-.480	-2.83	2.30	1.30	2.69	-.68
1966	-3.59	-.508	-2.81	2.13	1.23	2.46	-1.31
1967	-3.71	-.535	-2.34	2.15	1.29	2.76	-.39
1968	-3.83	-.583	-2.64	2.52	1.26	2.59	-.76
1969	-3.77	-.638	-2.35	2.51	1.26	2.84	-.01
1970	-3.55	-.677	-1.77	2.38	1.42	3.23	1.46
1971	-3.69	-.687	-1.78	2.39	1.45	3.43	1.53
1972	-3.81	-.831	-1.73	2.30	1.37	3.76	1.47

negative percent change indicates less inequality in the distribution of after-tax income than in before-tax income and a progressive tax. A positive percent change indicates more inequality in the distribution of after-tax income than in before-tax income and a regressive tax. No change in the Gini coefficient indicates a proportional tax.

From this table it can be seen that the CGC supports, with one exception, the direction of change in progressivity of the six taxes and the tax structure indicated by the LSLRP coefficient. The only tax for which the CGC differed substantially from the LSLRP coefficient was the payroll tax which according to LSLRP had a constant progressivity during the period, but according to CGC became more regressive. What is important is the fact that, according to both measures, the tax structure became less progressive during the period primarily because of the declining progressivity of the federal individual income tax and the federal/state corporate income taxes. In addition, according to CGC, the increasing regressivity of the payroll tax also contributed to the declining progressivity of the tax structure.

Detail for Sales and Excise Taxes and the Property Taxes

The collections for two of the six major tax groups, the sales and excise tax group and the property tax group, were each separated into three tax categories. The disaggregated revenues for each category were allocated as described in Chapter III. The results are discussed below.

Sales and Excise Taxes

The sales and excise taxes were separated into three categories, alcoholic beverages, tobacco, and a residual category - all other - in order to obtain more detail on their distributional impact. Table 21 shows the LSLRP and the CGC for each category of the sales and excise taxes. Both measures indicated that, (1) each category of the sales and excise taxes was regressive with a constant degree of progressivity during the period, and (2) the tax on alcoholic beverages was the least regressive, the residual category most regressive with the progressivity of the tax on tobacco products in between.

Property Taxes

The property taxes were separated also into three tax categories: land, commercial property, and residential property. Table 22 presents the LSLRP and the CGC

TABLE 21
 PROGRESSIVITY OF DISAGGREGATED
 SALES AND EXCISE TAXES
 USING LSLRP AND CGC
 1959-1972

Year	LSLRP			CGC		
	Alcoholic Beverages	Tobacco	Other	Alcoholic Beverages	Tobacco	Other
1959	1.00	1.00	1.02	.075	.307	1.94
1960	1.00	1.00	1.02	.053	.318	2.05
1961	1.00	1.00	1.02	.057	.325	2.03
1962	1.00	1.00	1.02	.058	.311	2.05
1963	1.00	1.00	1.02	.060	.313	2.07
1964	1.00	1.00	1.02	.059	.293	2.01
1965	1.00	1.00	1.02	.060	.290	1.91
1966	1.00	1.00	1.02	.058	.279	1.75
1967	1.00	1.00	1.02	.061	.270	1.78
1968	1.00	1.00	1.03	.071	.275	2.12
1969	1.00	1.00	1.03	.067	.253	2.15
1970	1.00	1.00	1.03	.064	.267	2.01
1971	1.00	1.00	1.03	.062	.257	2.03
1972	1.00	1.00	1.03	.061	.258	1.94

TABLE 22

PROGRESSIVITY OF DISAGGREGATED
PROPERTY TAX USING
ISLRP AND CGC
1959-1972

Year	ISLRP			CGC		
	Commercial	Land	Residential	Commercial	Land	Residential
1959	1.01	.997	1.01	.548	-.152	.735
1960	1.01	.997	1.01	.570	-.146	.762
1961	1.01	.997	1.01	.601	-.152	.794
1962	1.01	.997	1.01	.605	-.124	.802
1963	1.01	.997	1.01	.610	-.139	.808
1964	1.01	.998	1.01	.591	-.100	.786
1965	1.01	.998	1.01	.590	-.103	.785
1966	1.01	.998	1.01	.551	-.088	.746
1967	1.01	.999	1.01	.564	-.068	.767
1968	1.01	.999	1.01	.554	-.067	.753
1969	1.01	.999	1.01	.544	-.047	.743
1970	1.01	.9996	1.01	.614	-.052	.827
1971	1.01	.9998	1.01	.627	-.051	.838
1972	1.01	.9999	1.01	.594	-.050	.798

for each category of the property tax. Two of the three property taxes - those on commercial and those on residential property - were regressive throughout the period and both, according to LSLRP, were slightly more regressive than the sales tax on alcoholic beverages and the tax on tobacco products but not as regressive as the residual sales and excise tax category - all other.

The property tax on land stands alone in this group as a progressive tax. Although its progressivity declined, it was progressive over the period.

Distribution of Income

The distribution of total family income by income class developed for this study used net national product (NNP) as a proxy for total family income. This income was allocated to the ten income classes using data compiled by the IRS and published in Statistics of Income. From the distribution of total family income by income class, income by population percentile, decile, and quintile was estimated using the same cubic spline interpolating function employed to estimate the Lorenz curves.

The distribution of total family income developed and used in this study differs slightly from both the distribution of money income which Pechman and Okner developed from Survey of Economic Opportunity data

(SEO), and from the distribution of adjusted family income (AFI) developed by the same researchers from their own MERGE file and used in their study of the U. S. tax burden.⁶⁴

The distribution of income developed by Pechman and Okner from SEO data is unsatisfactory in a study of tax burdens and tax progressivity because it describes the distribution of money income only. It is preferable to examine the burden and progressivity of taxes in relation to total income. While the methodology employed by Pechman and Okner in developing the distribution of adjusted family income from MERGE file data is not feasible here, it is important to obtain a distribution of income in the broad sense rather than the distribution of money income alone.

Table 23 sets out for 1966 the distribution of total family income developed and used in this study to compare it with Pechman and Okner's distribution of money income developed from SEO data, and their distribution of adjusted family income developed from MERGE file data. It can be seen that while the description of the distribution of total income developed and used in

⁶⁴ Joseph A. Pechman and Benjamin A. Okner, Who Bears the Tax Burden? (Washington, D.C.: The Brookings Institution, 1974), p. 46.

(SEO), and from the distribution of adjusted family income (AFI) developed by the same researchers from their own MERGE file and used in their study of the U. S. tax burden.⁶⁴

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⁶⁴ Joseph A. Pechman and Benjamin A. Okner, Who Bears the Tax Burden? (Washington, D.C.: The Brookings Institution, 1974), p. 46.

TABLE 23

SHARES OF TOTAL INCOME, MONEY INCOME,
AND ADJUSTED FAMILY INCOME BY
POPULATION QUINTILE, 1966

Population Quintile	Total Income	Money Income	Adjusted Family Income
First	4.1%	4.3%	3.7%
Second	7.7	11.3	9.9
Third	16.0	17.3	16.1
Fourth	24.0	24.5	22.6
Fifth	<u>48.3</u>	<u>42.6</u>	<u>47.9</u>
	100.0%	100.0%	100.0%
Top 5%	20.2	16.0	22.1
Top 1%	7.1	4.8	10.5

Source: Author's worksheet and Pechman and Okner, Who Bears the Tax Burden?, p. 46.

Note: Columns may not add to 100% due to rounding.

this study differs from the other two, it is more nearly like the distribution of adjusted family income than that of money income alone.

The description of the distribution of total family income developed for use in this research is acceptable because the interest is to characterize certain changes in tax progressivity over time and not to establish precisely the distribution of income, the tax burden, or tax progressivity for a particular year or period.

The distribution of income by population percentiles was also estimated. This was done because the CGC is a rather gross assessment of the impact a tax has on the distribution of income and it is helpful to look in greater detail at the changes responsible for variation in the CGC. In short, the distribution of income by population decile is useful to highlight which deciles benefit more, which less, from a given tax and the tax structure.

In using and interpreting these figures it is important to recognize that several of the important taxes and the tax structure are proportional or nearly proportional and the impact of such taxes on the distribution of income is minimal. Even taxes that depart significantly from proportionality do not necessarily have a dramatic impact on the distribution of income.

Table 24 shows the impact that three taxes - one progressive, one proportional, and one regressive - had on the distribution of income in 1959. Even for the progressive federal individual income tax and the combined sales and excise taxes which were regressive, the impact on income by population decile is not great.

Despite the often trivial impact a tax may have on the distribution of income it is instructive to examine, especially for the overall tax structure, just how different groups fare.

Table 25 shows, for selected years spanning the period of this study, the impact of the tax structure on the distribution of income by population decile. The pattern of change that emerges is one where the lower income deciles become increasingly worse off after than before tax and the top income deciles, the tenth being an exception, become increasingly better off after than before tax. The top or tenth decile continues to be worse off after tax but between 1959 and 1972 this decile benefits in that after tax income becomes an increasingly larger fraction of before tax income.

Effective Rates

The effective tax rate is the ratio of the tax paid to income received. It was computed for each income class and was used to augment LSLRP and CGC to obtain a

TABLE 24

CUMULATIVE PERCENTAGES OF TOTAL INCOME
FOR SELECTED TAXES FOR 1959

Population Decile	Federal Individual Income Tax		Property Tax (Land)		Sales and Excise Tax (Combined)	
	Before Tax	After Tax	Before Tax	After Tax	Before Tax	After Tax
First	2.66	2.82	2.66	2.66	2.66	2.51
Second	5.33	5.65	5.33	5.33	5.33	5.04
Third	8.03	8.51	8.03	8.03	8.03	7.59
Fourth	13.06	13.73	13.06	13.06	13.09	12.50
Fifth	20.26	21.16	20.26	20.27	20.26	19.61
Sixth	29.05	30.18	29.05	29.08	29.05	28.32
Seventh	39.47	40.83	39.47	39.52	39.47	38.72
Eighth	52.30	53.84	52.30	52.38	52.30	51.56
Ninth	68.13	69.72	68.13	68.24	68.13	67.47
Tenth	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 25

INCOME SHARE BEFORE AND AFTER
TAX FOR THE TAX STRUCTURE
SELECTED YEARS

Population Decile	Percent Share of Income		Cumulative Percentage of Income	
	Before Tax	After Tax	Before Tax	After Tax
1959				
First	2.66	2.55	2.66	2.55
Second	2.67	2.56	5.33	5.11
Third	2.70	2.58	8.03	7.69
Fourth	5.03	5.04	13.06	12.73
Fifth	7.20	7.37	20.26	20.10
Sixth	8.79	9.02	29.05	29.12
Seventh	10.42	10.87	39.47	39.99
Eighth	12.83	13.50	52.30	53.49
Ninth	15.83	16.76	68.13	70.25
Tenth	31.87	29.75	100.00	100.00
1966				
First	2.05	1.92	2.05	1.92
Second	2.05	1.93	4.10	3.85
Third	2.07	1.94	6.17	5.79
Fourth	5.59	5.64	11.76	11.43
Fifth	7.05	7.15	18.81	18.58
Sixth	8.88	9.03	27.69	27.61
Seventh	10.96	11.30	38.65	38.91
Eighth	13.04	13.60	51.69	52.51
Ninth	17.78	18.99	69.47	71.50
Tenth	30.53	28.50	100.00	100.00
1972				
First	1.43	1.22	1.43	1.22
Second	1.44	1.22	2.87	2.44
Third	3.59	3.43	6.46	5.87
Fourth	5.08	4.92	11.54	10.79
Fifth	6.89	6.67	18.43	17.46
Sixth	8.74	8.63	27.17	26.09
Seventh	11.67	12.02	38.84	38.11
Eighth	12.45	12.91	51.29	51.02
Ninth	19.06	20.40	70.35	71.42
Tenth	29.65	28.58	100.00	100.00

clearer picture of the burden of a tax and to assess the variation of the burden over time for different income classes.

The Progressive Taxes

The progressive taxes, of the six major ones studied, are the federal individual income tax, the state/local individual income taxes, and the federal/state corporate income taxes. The effective rates for selected years for these taxes are shown in Table 26. It can be seen from this table that for both the federal individual income tax and the state/local individual income taxes, the effective rate increases on larger incomes throughout the income range.

For the federal individual income tax the rate for all classes declined over the period 1959-1972, whereas for the state/local individual income taxes, it increased. All this supports the findings using the progressivity measures and the distribution of income.

The effective rates for the federal state/corporate income taxes reveal something that is not uncovered by the progressivity measures or the distribution of income. From Table 26 we can see that this tax is regressive for the lower income classes and during the period the regressive range increased from the first four classes in 1959 to include the first eight classes in 1972. In

addition, the effective rates for all income classes fell dramatically during the period. This tax was progressive, but only because of the big tax bite out of the very large incomes, not because of a smooth progression from the lower to the higher incomes.

An important observation regarding the progressive taxes is just how little progression there was and how, for the federal/state corporate income taxes there was, over a wide income range, significant regression. The federal individual income tax, for all the clamor about confiscatory rates, never took more than 10 percent of total income from more than five percent of the tax units and the effective rate never exceeded 20 percent.

The Regressive Taxes

The sales and excise taxes, the property taxes, and the payroll tax were all regressive. The effective rates, for selected years for these taxes are shown in Table 27. The effective rates reveal two aspects of these taxes that did not emerge from the progressivity measures or the distribution of income by population decile.

First there was a certain regression in the rates that the LSLRP and the CGC measures did not uncover. Second, for all three of these taxes, the increase in the tax burden for the two income classes below \$4,000

TABLE 27

EFFECTIVE RATES SALES AND EXCISE, PROPERTY
AND PAYROLL TAXES, SELECTED YEARS

Income Classes	Sales and Excise Taxes			Property Taxes			Payroll Taxes		
	1959	1966	1972	1959	1966	1972	1959	1966	1972
under \$3,000	9.61%	10.48%	13.88%	6.45%	8.07%	11.19%	7.58%	7.55%	11.83%
3,000-4,000	6.06	6.53	9.02	3.74	4.78	7.08	8.07	8.12	11.25
4,000-5,000	5.65	5.98	7.75	3.31	4.11	5.80	8.31	8.41	11.65
5,000-6,000	5.02	5.48	7.08	3.08	3.76	5.12	7.41	8.64	12.07
6,000-7,000	4.73	5.04	6.79	2.98	3.55	4.74	6.31	8.86	12.21
7,000-8,000	4.47	4.77	6.13	2.90	3.40	4.43	5.41	7.93	12.66
8,000-10,000	4.11	4.40	5.73	2.76	3.24	4.20	4.40	6.59	11.04
10,000-15,000	3.50	3.78	4.95	2.62	2.95	3.80	2.76	4.44	7.95
15,000-25,000	2.68	2.91	3.83	2.58	2.80	3.27	1.16	2.24	4.53
25,000 and up	1.46	1.75	2.30	2.88	2.97	3.17	.30	.63	1.50
All Classes	4.77	4.52	4.88	3.32	3.59	4.05	5.25	5.55	6.92

was significant. While the total number and the percent of individuals and families in these low income classes diminished, the burden for those that remained increased dramatically.

There was a sharp percent increase in the tax burden for taxpayers in the two income classes above \$15,000. For instance, the payroll tax for the \$25,000 and up class increased from .3% in 1959 to 1.5% in 1972, a five fold increase. But the total burden remained small, especially in comparison with the burden for the very low income individuals and families.

Sales/Excise and Property Taxes Disaggregated

The sales and excise tax group and the property tax group were separated and the effective rates by income class were computed for the separate categories in the same way as for the combined taxes. Table 28 shows the effective rates for the disaggregated sales and excise taxes.

For the sales and excise taxes, this separation revealed that the tax on alcoholic beverages was the most proportional of the three but was characterized by mild progression in the rates for the low income units and mild regression for the higher income units. The tax, in terms of total revenue, was a minor one,

TABLE 28

EFFECTIVE RATES DISAGGREGATED SALES AND
EXCISE TAXES, SELECTED YEARS

Income Classes	Alcoholic						Tobacco		All Other			
	Beverages			Products								
	1959	1966	1972	1959	1966	1972	1959	1966	1972	1959	1966	1972
under \$3,000	.86%	.75%	.69%	1.12%	1.17%	1.32%	7.63%	8.56%	11.87%			
3,000-4,000	.90	.79	.69	.85	.90	.97	4.31	4.84	7.35			
4,000-5,000	.94	.82	.69	.78	.82	.88	3.92	4.35	6.17			
5,000-6,000	.90	.80	.71	.70	.74	.81	3.42	3.94	5.56			
6,000-7,000	.95	.81	.73	.65	.68	.76	3.13	3.55	5.31			
7,000-8,000	.94	.83	.69	.60	.64	.71	2.94	3.30	4.73			
8,000-10,000	.92	.82	.73	.52	.57	.64	2.67	3.02	4.36			
10,000-15,000	.88	.79	.71	.35	.41	.52	2.26	2.58	3.71			
15,000-25,000	.68	.64	.65	.24	.27	.33	1.76	2.01	2.85			
25,000 and up	.35	.47	.46	.10	.16	.20	1.01	1.12	1.64			
All Classes	.84	.75	.65	.60	.54	.49	3.33	3.23	3.74			

accounting for only about one percent of total tax revenues.

The effective rates for tobacco products and the residual category - all other - were both characterized by regression throughout the income scale. This was consistent with the LSLRP and the CGC values for these taxes.

The effective rates for the disaggregated property taxes shown in Table 29 revealed that the tax on land, over all a progressive tax, had a U-shaped effective rate curve. This means mild regression at the lower income levels and some progression at the higher income levels.

The taxes on commercial property and residential property were characterized by regressive effective rates, as expected on the basis of the LSLRP and CGC measures for these taxes.

Both the sales and excise taxes and the property taxes were characterized by regressive effective rate curves. In the disaggregation carried out here, the only taxes in these groups not characterized by a progressive effective rate curve are the alcoholic beverages tax at the lower income levels and the tax on land at the upper income levels.

These taxes - sales and excise and property - as a

TABLE 29

EFFECTIVE RATES DISAGGREGATED PROPERTY TAXES, SELECTED YEARS

Income Classes	Commercial			Land			Residential		
	1959	1966	1972	1959	1966	1972	1959	1966	1972
under \$3,000	2.21%	2.75%	3.72%	.42%	.58%	1.65%	3.82%	4.74%	6.81%
3,000-4,000	1.25	1.56	2.31	.21	.39	.74	2.28	2.83	4.04
4,000-5,000	1.14	1.40	1.94	.15	.32	.56	2.02	3.39	3.31
5,000-6,000	.10	1.27	1.75	.14	.26	.50	1.95	2.23	2.87
6,000-7,000	.91	1.14	1.67	.14	.22	.43	1.93	2.19	2.65
7,000-8,000	.85	1.06	1.48	.17	.18	.37	1.88	1.16	2.57
8,000-10,000	.77	.97	1.37	.18	.19	.28	1.80	1.08	2.55
10,000-15,000	.65	.83	1.17	.32	.21	.25	1.64	1.91	2.38
15,000-25,000	.51	.64	.89	.71	.55	.29	1.37	1.61	2.08
25,000 and up	.29	.36	.52	1.48	1.28	.98	1.11	1.32	1.67
All Classes	.96	1.04	1.17	.37	.39	.45	1.99	2.15	2.43

group became more regressive during the period 1959-1972.

The Tax Structure

In the end it is the tax structure that is of primary importance. The LSLRP coefficients for the tax structure are shown in Table 19, the CGC measures are presented in Table 20. Table 25 summarizes for selected years the impact of the tax structure on the distribution of income. The purpose of this section is to analyze the changes in the effective rates for the tax structure by income class over the period 1959-1972. These rates for selected years are presented in Table 30.

The effective rate curve was U-shaped throughout the period. There was some regression at the bottom of the income scale and mild progression at the top. In the middle, for the vast majority of taxpayers, the tax structure was nearly proportional. Strictly, the effective rates were slightly regressive over the middle incomes.

Interesting as these findings are, it is more important to examine how the effective rate curve shifted between 1959 and 1972. During this period the rate on the lowest incomes rose sharply, from a little over 29 percent to over 39 percent. This was a larger increase than that experienced by any other income class.

For the middle income classes, through and

TABLE 30
EFFECTIVE RATES TAX STRUCTURE
SELECTED YEARS
PERCENT OF TOTAL INCOME

Income Classes	1959	1961	1963	1965	1967	1969	1971	1972
under \$3,000	29.45%	30.00%	31.87%	31.33%	32.54%	37.56%	39.14%	39.41%
3,000-4,000	24.82	25.15	26.52	26.49	27.41	31.95	31.87	32.73
4,000-5,000	24.71	24.97	26.22	25.78	27.07	30.02	30.28	31.30
5,000-6,000	23.44	23.76	24.91	24.47	26.92	30.40	30.66	31.59
6,000-7,000	22.77	23.07	23.85	23.07	26.68	29.76	30.94	31.52
7,000-8,000	22.41	22.52	23.29	22.39	25.45	30.18	30.55	31.78
8,000-10,000	22.12	22.24	22.67	21.40	24.13	28.81	29.05	30.03
10,000-15,000	22.52	22.06	22.25	20.56	22.20	26.16	26.08	26.78
15,000-25,000	27.75	26.99	25.15	26.44	26.27	24.81	23.67	24.02
25,000 and up	50.06	51.19	47.59	45.37	41.76	44.70	37.66	37.13
All Classes	26.57	26.48	26.70	25.73	27.11	30.26	28.94	29.35

including the \$10,000-\$15,000 class, the effective rate increased during the period. The effective rate declined for the two top income classes, from 50 percent to just over 37 percent for the \$25,000 and up class, the largest decline in effective rate experienced by any income class; and from almost 28 percent to just over 24 percent for the \$15,000-\$25,000 class. While these decreases were significant, it must be noted that the number of taxpayers in these classes increased significantly.

The picture that emerges from this analysis of the effective rate curve is that the declining progressivity of the tax structure is the result of the lower rates on the largest incomes coupled with the increasing rate for all other income classes. The lowest income individuals and families, those earning \$3,000 and less, experienced the sharpest increase.

The Effective Rate Curve and
The Incidence Assumptions

The effective rate curve presented above is U-shaped. While this is consistent with most tax burden studies, Pechman and Okner have demonstrated that this shape depends upon the incidence assumptions employed.⁶⁵

⁶⁵Ibid., p. 50.

Only three of the eight sets of assumptions they tested gave rise to such a curve. The other five sets gave rise to constantly rising curves. Also, Richard and Peggy Musgrave, in their estimate for 1968, did not obtain a U-shaped rate curve.⁶⁶

However, the central issue of this study is not the shape of the effective rate curve, and the curve obtained is sufficient to the task of assessing the changes in the curves over time.

Conclusion

The separate taxes were characterized as decreasing in progressivity and increasing in regressivity. These changes contributed to the decreasing progressivity of the tax structure. The examination of the distribution of income by population decile and the effective rate curve revealed that the brunt of these changes was felt by the lowest income individuals and families, while those in the highest income classes benefited most.

⁶⁶Richard A. Musgrave and Peggy Musgrave, Public Finance in Theory and Practice (New York: McGraw-Hill, 1973), p. 368.

Chapter VI

THE IMPACT OF GROWTH, TAX CODE CHANGES, AND INFLATION ON TAX PROGRESSIVITY 1959-1972

The changes in the degree of progressivity of the major taxes and the overall tax structure for the period 1959-1972 were shown in Chapter V. In Chapter VI attention shifts to examining the factors that induced this changing progressivity.

Prior to 1960, the analysis of tax codes was carried out as if the tax would operate in a neutral economic environment uncharacterized by growth in nominal income. It was thought that the progressivity of a tax and the revenue generated would be established by the tax legislation or tax code. While it was recognized that for income and sales taxes total revenue was, in part, a function of the level of GNP, the interaction of the tax code with other economic factors or variables was not addressed.

Walter Heller, Chairman of the Council of Economic Advisers during the Kennedy administration, was responsible for promoting increased awareness that in a growing economy the revenue from a progressive tax must increase faster than both real output and government expenditures. This phenomenon, labeled fiscal drag, was assumed to slow economic growth.

More recently, attention has been drawn to the interaction between a progressive tax and another aspect of the economic environment, inflation. George von Furstenberg examined how inflation affected the progressivity of the federal individual income tax. Emil Sunley and Joseph Pechman have studied how inflation and the several tax reform acts have affected the effective rates of the federal individual income tax. It is clear that the rate of inflation alters the progressivity of certain taxes, just as the rate of economic growth alters or determines the revenue from income and other taxes. In general, during the past several decades, there has been an increasing awareness and interest in the interaction of the tax codes with different aspects of the economy. However, other factors besides growth and inflation can affect the progressivity of the tax structure. Some of these are the initial distribution of income, the changing age profile of the work force, and changing relative factor productivities.

Although all of these factors can interact with a tax code, a comprehensive examination of each was beyond the scope of this study. What was undertaken was an examination of the role or impact of changes in the tax codes, the rate of growth in income, and the rate of

price inflation on the progressivity of the U. S. tax structure during the period 1963-1972.

Three estimates were made of what tax progressivity would have been for each year from 1963 to 1972 under three sets of assumptions. The first set assumed no changes in the tax codes, and no change in the rate of growth in income or the rate of price inflation. The second set also assumed no changes in the tax code but permitted prices and income to increase at the rates at which they actually increased between 1963 and 1972. In the third set of assumptions, the tax codes were permitted to change as they actually did, but the rate of growth in income and the rate of price inflation were held constant. These estimates of what tax progressivity would have been under different conditions were compared with the actual tax progressivity for each year of the 1963-1972 period to determine the independent effect on tax progressivity of changes in the tax code, the rate of growth in income, and the rate of price inflation.

These estimates of tax progressivity were made by dividing the years studied (1959-1972) into two periods, a stable or base period (including the years 1959-1962) and a change period (including the years 1963-1972). This division was made because during the earlier

period, 1959-1962, no major tax code changes were enacted and the rate of price inflation was moderate.⁶⁷ However, during the 1963-1972 period, major tax code changes were enacted in 1962, 1964, 1969, and 1971. Moreover, the rate of price inflation for the period was more than three times that of the base period.⁶⁸

To obtain our estimates it was necessary to make several simplifying assumptions, and project into the change period the base period rate of growth in NNP, the base period effective rate structure, and the base period movement of tax-income units from lower into higher income classes.

It was assumed that:

1. The movement of tax-income units from lower income classes into higher income classes in the base period reflected economic growth, changing productivity, changing age profile of the work force, and comparatively little effect of inflation;

⁶⁷The consumer price index increased between 1959 and 1962 at an average annual rate of 1.1%.

⁶⁸During 1963-1972 the rate of inflation averaged 3.7% per annum, with prices increasing by 5% or more per year during three of the ten years.

2. The change in the rate at which tax-income units move into higher income classes in the change period is due mainly to the accelerated rate of inflation in the change period.

And the base period was characterized by:

1. An average annual rate of growth in NNP of about 4.75% (see Table 31);
2. A relatively constant effective tax rate (see Table 32);
3. A relatively constant income class density (see Table 33).

Estimating what tax progressivity would have been during the period 1963-1972 under different sets of assumptions also required identifying the stability of the base period and projecting it through the change period. This was accomplished by selecting several variables as proxies for the stability of the base period, computing the average annual change in these variables during the base period, and projecting them into the 1963-1972 period. The average annual rate of growth in aggregate income was used as a proxy for the rate of economic growth. The rate of shifting income units from lower to higher income brackets was used as a measure of inflation, and the effective tax rate by

TABLE 31

NET NATIONAL PRODUCT
ACTUAL AND PROJECTED
(Amounts in Millions)

Year	Projected	Actual
1959		\$ 441,742
1960		459,608
1961		474,140
1962		507,461
1963	\$531,535	533,080
1964	556,751	576,330
1965	583,163	625,119
1966	610,585	685,908
1967	639,806	725,032
1968	670,159	791,052
1969	701,951	852,545
1970	735,251	889,826
1971	770,132	961,196
1972	806,667	1,055,074

Source: Survey of Current Business, U. S. Department of Commerce, July 1964, July 1968, July 1970, July 1974.

TABLE 33
 PERCENT FAMILIES BY INCOME CLASS
 FROM IRS STATISTICS OF INCOME
 ACTUAL AND PROJECTED

Income Class	Base Period					Change Period								
	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
	Actual													
under \$3,000	35.7	35.1	34.4	33.4	32.7	32.1	31.0	30.4	29.3	28.2	27.1	23.9	22.6	21.4
3,000-4,000	11.7	11.4	11.0	10.6	10.0	9.5	9.0	8.4	8.0	7.6	7.1	7.0	6.8	6.4
4,000-5,000	11.9	11.3	10.8	10.1	9.8	9.4	8.6	7.9	7.6	7.2	6.8	6.9	6.7	6.6
5,000-6,000	10.7	10.6	10.2	9.9	9.2	8.9	8.1	7.6	7.3	6.8	6.4	6.4	6.2	6.1
6,000-7,000	8.5	8.7	8.6	8.6	8.6	8.4	8.2	7.5	7.3	6.8	6.1	6.3	5.7	5.5
7,000-8,000	6.2	6.4	6.8	7.0	7.2	7.5	7.4	7.2	7.2	6.5	6.2	6.0	5.9	5.5
8,000-10,000	7.3	7.7	8.4	9.1	9.7	9.2	11.2	11.9	11.7	11.8	11.4	11.4	11.1	10.3
10,000-15,000	5.3	6.0	6.8	7.9	8.9	10.3	11.5	13.3	14.6	16.3	18.1	19.1	19.7	19.9
15,000-25,000	1.7	1.8	2.0	2.3	2.7	3.3	3.7	4.4	5.2	6.6	8.3	10.1	11.9	14.1
25,000 and up	1.0	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.8	2.2	2.5	2.9	3.4	4.1
	Projected													
under \$3,000	32.6	31.9	31.1	30.3	29.6	28.8	28.0	27.3	26.5	25.7	25.0	24.3	23.6	22.9
3,000-4,000	10.2	9.9	9.5	9.1	8.8	8.4	8.0	7.7	7.3	6.9	6.5	6.1	5.7	5.3
4,000-5,000	9.5	8.9	8.3	7.7	7.1	6.5	5.9	5.3	4.7	4.1	3.5	2.9	2.3	1.7
5,000-6,000	9.6	9.4	9.1	8.8	8.6	8.3	8.0	7.8	7.5	7.2	6.9	6.6	6.3	6.0
6,000-7,000	8.6	8.7	8.7	8.7	8.8	8.8	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5
7,000-8,000	7.3	7.5	7.8	8.1	8.3	8.6	8.9	9.1	9.4	9.7	10.0	10.3	10.6	10.9
8,000-10,000	9.7	10.3	10.9	11.5	12.1	12.7	13.3	13.9	14.5	15.1	15.7	16.3	16.9	17.5
10,000-15,000	8.8	9.6	10.5	11.4	12.2	13.1	14.0	14.8	15.7	16.6	17.5	18.4	19.3	20.2
15,000-25,000	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.1
25,000 and up	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4

income class was used as a measure of the relatively stable tax code.

NNP increased in the base period at an actual rate of 4.75% per annum. This rate of growth was used to project NNP through the change period. These two series, the actual and the projected levels of NNP, are set out in Table 31.

The percent of families by income class was projected into the change period by using as the annual increment (or decrement), the average annual change in the percent of families in each class during the base period. For example, from Table 33 we see that for the under \$3,000 income class, the average annual movement of families from this income class into higher income classes was $-.7666$ per period $[(-.6) + (-.7) + (-1.0)]/3$. In other words, during the base period, on the average, the number of families in the under \$3,000 income class decreased by slightly more than $3/4$ of 1% per year.

The percent of families in the under \$3,000 income class for each year of the change period was defined by adding the average annual decrease in the percent of families in the class to the percent of families in the class during the preceding year. For example, for 1963 the percent families in the under \$3,000 income class was 32.6%. This was obtained by taking the percent

families in this class in 1962 (33.4) and adding the average annual decrease of families in this income class during the base period (-.7666), see Table 33.

Then, the average changes in the effective tax rates during the base period were projected into the change period using a procedure similar to that used in projecting the percent families by income class. Table 32 shows the actual and projected effective tax rates for all taxes for each year of the study.

These projections were used to estimate the strength of each of the major forces: (1) economic growth, (2) changes in the tax codes, and (3) inflation in affecting the changing tax progressivity revealed in the first phase of this research.

The first experiment isolates how economic growth might affect the progressivity of the tax structure. In this experiment an effort was made to examine how tax progressivity would have changed during the change period if the other variables were constant and the rate of economic growth was the same as the base period.

The experiment approximated these conditions by allocating the projected level of NNP (see Table 31) to income classes using the projected percent families by income class. This approximated the income that would have been received by each income class if the base

period rate of economic growth and rate of price inflation had continued into the change period.

Finally, the assumption of no change in the tax codes was approximated by applying the effective tax rates shown in Table 32 to the estimated levels of income shown in Table 31.

The second experiment estimated the way progressivity would have changed, under the rate of economic growth and rate of price inflation that actually occurred during the change period but assuming no tax code changes.

The conditions of this experiment were estimated by using the actual level of NNP and allocating this income according to the actual percent families by income class. Then the condition that no tax changes occurred was achieved by using the projected effective tax rate schedule shown in Table 32.

These two experiments, in conjunction with the results obtained from phase one of this research, make it possible to estimate the separate impact of economic growth, changes in tax codes, and accelerated inflation on the progression of the tax structure.

A brief statement of the results of this part of the research was presented in the introduction (Table 3); a more detailed description follows.

Phase One: Tax Progressivity Without Tax Code
Changes or Accelerated Price Inflation

The first phase of this part of the research involved estimating how tax progressivity would have changed during the period 1963-1972 if tax codes, rate of growth in income, and price inflation had continued at levels or rates of change comparable to those that prevailed during the base period.

This estimate of tax progressivity for each year 1963-1972 was obtained by distributing the projected aggregate income (NNP) for each year to each of the ten income classes using the projected series of percent income units (families) by income class. Then the total tax by income class was obtained by applying the projected annual effective tax rate series and finally, from these tax and income figures by income class, the estimated tax progressivity for each year 1963-1972 was computed in the same way that the actual tax progressivity was computed using the LSLRP and the CGC.

This estimate reveals that for the 1963-1972 period, without any change in the tax code, and with a constant rate of growth in income, and a constant rate of price inflation, tax progressivity would have declined more rapidly than it actually did and would have become over 50 percent more regressive by 1972. This suggests that while economic growth was responsible for a decline in

tax progressivity during the period, the rate of price inflation and the tax code changes served to increase it.

Phase Two: Tax Progressivity with
Accelerating Price Inflation

In this phase of the research the impact of inflation on tax progressivity was estimated by using the actual level of income (NNP), the actual percent of income units (families) by income class, and the total tax by income class was computed using the projected effective rate structure for the period 1963-1972. In this experiment the economy was permitted to change as it actually did, but the tax code was changed according to the base period pattern. The LSLRP and the CGC were computed in the same manner.

The results of this experiment are shown in Table 3. It can be seen that if the actual rate of price inflation between 1963 and 1972 had been experienced and the tax code had been changing as it did during the base period, tax progressivity would have declined through 1966, remained relatively constant from 1967 through 1970, and increased slightly for the years 1971 and 1972.

Even though tax progressivity declined and continued for the period at a level below that which prevailed during the base period, it never turned regressive with price inflation in the model. This suggests

that price inflation, unlike economic growth, increased tax progressivity. However, during this period the rate of inflation was not sufficient to offset the other forces operating to reduce tax progressivity.

Phase Three: Tax Progressivity
and Tax Code Changes

The third experiment isolated the impact of tax code changes on tax progressivity. This was accomplished by using the actual effective rates by income class for the period 1963-1972, with the projected series for aggregate income (NNP) and percent families by income class.

The results of this experiment are presented in Table 3, column 3. The changing tax code, in the absence of any change in the rate of price inflation and the rate of economic growth, would have resulted in a tax structure more progressive for the years 1964-1968 and less progressive from 1969 to 1972. From the first experiment it was learned that the tax structure between 1963 and 1972 would have turned regressive in 1965 and become increasingly regressive through 1972. This third experiment revealed that with the tax code changes, the tax structure would not have become regressive until 1967 but would have by 1972 been 70 percent more regressive than if the base period conditions

continued during the 1963-1972 period.

Summary

The first important finding of this part of the research was that in the U. S. between 1959 and 1962, with negligible price inflation, moderate economic growth, and no major tax code changes, tax progressivity declined by 60 percent. Apparently, an increasing inequality in the pre-tax distribution of income and a decline in the proportion of tax revenue from the progressive taxes contributed to this reduction of tax progressivity.

When the assumptions were changed to include price inflation, holding the tax code constant, tax progressivity was greater each year between 1963 and 1972. Through 1966 the effect of price inflation was sufficient only to retard the decrease in tax progressivity, but beginning in 1967, it increased it and by 1972 would have restored it to the average level of the 1959-1962 base period.

The tax code changes, if imposed in the absence of accelerated price inflation, would have resulted in a more progressive tax structure through 1968 but from 1969 through 1972 would have made the tax structure more regressive than if the base period conditions persisted through 1972.

These experiments are a first step toward an assessment of the impact of inflation on tax progressivity. They are preliminary in several ways: (1) the estimates are for the overall tax structure only. No attempt is made in this part of the study to disaggregate and assess the impact of inflation on the progressivity of individual taxes, (2) several important forces that impact on tax progressivity are not addressed directly, and (3) the model employed assesses indirectly the impact of economic growth, price inflation, and tax code changes. For example, the impact of inflation on tax progressivity is not assessed within a model that examines the relationship between changes in the price level and taxable income but rather within one that examines the shifting of tax paying individuals and families from lower to higher marginal tax brackets. While inflation contributes to this shifting, there are certainly other factors involved and this compromises the effectiveness of this proxy and the experiments conducted. The problems aside, these experiments are a useful first approximation of the nature and magnitude of the impact of price inflation, tax code changes, and economic growth on tax progressivity.

Chapter VII

CONCLUSIONS AND PROSPECTS

During the period 1959-1972 the progressivity of the overall tax structure declined. The CGC went from -1.90 in 1959 to +1.47 in 1972, a decline of more than 170 percent. This change was the result of the impact of the declining progressivity of the federal individual income tax and the federal/state corporate income tax coupled with the increasing regressivity of the payroll tax.

The effect of the increased rate of price inflation was at first to retard the decline in tax progressivity but beginning in 1967 and continuing through 1972 (1969 being an exception) it actually increased it. The effect of the changes in the tax code varied over the period, first increasing progressivity (1963-1966), then retarding its decline (1967-1968), and finally increasing it (1969-1972).

From Taxes to Expenditures

These findings are consistent with the recent work of Reynolds and Smolensky who found that between 1950 and 1970 "the overall tax system had drifted from progressive to proportional or perhaps even slightly

regressive by 1970."⁶⁹ As they point out, this does not indicate that the redistributational effect of governmental activity has diminished. For this to be so, the progressivity of government expenditures and transfer payments would also have to be proportional or even regressive and Reynolds and Smolensky demonstrate that this is not the case. There has been a shift in the use of the instruments employed by government to reduce the dispersion or inequality in the distribution of income - a shift from tax programs to expenditure transfer programs.

Tax Reform and Indexing

For most of the past decade, price inflation has been a matter of more serious concern than it has been during any other period of this century. Not surprisingly, there has been much discussion of various ways to control the rapid, occasionally double digit rate of inflation.

There has been considerable attention devoted to wide-ranging tax reform as well as a growing awareness of the inflation-caused (or non-discretionary) inequities in certain taxes such as the federal individual income

⁶⁹Morgan Reynolds and Eugene Smolensky, Public Expenditures, Taxes, and the Distribution of Income, p. 92.

tax. This narrower concern has led to numerous proposals, all intended to minimize or eliminate the inflation caused inequities.

Tax Structure Changes

The finding that the progressivity of our tax structure has declined so markedly without legislative action suggests "tax reform" by default. The question is not whether we want tax reform but whether we want reform of the discretionary or of the spontaneous/involuntary type.

Spontaneous/involuntary tax reform is what we have been experiencing for the past 15 years. However, it is to be noted that while this is so, other work, specifically that of Reynolds and Smolensky, suggests that we have not had spontaneous/involuntary fiscal reform because, while tax progressivity has declined, expenditure (really expenditure/transfer) progressivity has increased sufficiently to have maintained constant fiscal progressivity during this period.⁷⁰ Reynolds and Smolensky demonstrate that the post fiscal distribution of income has been constant over the period 1950-1970. This suggests that the effect of the spontaneous/involuntary tax reform has been nullified by the expenditure program.

⁷⁰Morgan Reynolds and Eugene Smolensky, Public Expenditures, Taxes, and the Distribution of Income, pp. 75 and 92.

Although this leads to the conclusion that there have been tax and expenditure reforms of the spontaneous/involuntary type, this is not to say that the results are contrary to political preference or economic efficiency. However, in a society dedicated politically to the democratic process and economically to the free market, it would seem far more desirable to address both tax and expenditure reforms directly and openly.

Indexing

The impact of inflation is felt throughout the entire economy. The distribution of income and wealth can be altered; resource allocation can be distorted and investment, employment, and output can be reduced. Inflation can have an impact on the distribution of wealth through the debtor/creditor relationship; on the distribution of income through a progressive tax such as the federal individual income tax; on investment, employment, and output through the interest rate, and on the allocation of resources through a distortion of relative prices.

It is no surprise that inflation, affecting our economy with the scope and consequence it does, receives so much attention. Aside from the traditional monetary and fiscal remedies which call for controlling the growth of the money supply and government expenditures

respectively, perhaps no other cure has received more extensive examination than indexation.

Indexation proposals have been offered as a solution to two different but similar problems: (1) the control, reduction, or elimination of price inflation, and (2) the mitigation or elimination of the inflation caused inequities in our tax system - especially the federal individual income tax.

The indexation proposals offered as a means to end or control price inflation have been very comprehensive in scope. They include indexing wages and salaries, money and capital transactions, rents and leases, insurance premiums and benefits, and lastly, various aspects of both the individual and corporate income taxes.⁷¹

The proposals offered to mitigate or eliminate inflation caused inequities in our tax structure are not as comprehensive as those offered to control or eliminate inflation alone. Proposals of this latter type usually involve indexing some combination of the tax base, bracket rates, exemptions, or deductions.

The debate continues as to both the effectiveness and appropriateness of comprehensive indexation as a

⁷¹The indexation of taxes is often excluded from these proposals offered to control or eliminate price inflation.

means to control or end price inflation. The research conducted as part of this dissertation does not enlighten this debate, which turns as much on what a particular analyst sees as the driving force of the inflation as on the effectiveness of the control mechanism, but this research is pertinent to an assessment of indexation as a policy instrument to mitigate or eliminate the spontaneous development of inequities in the tax structure.

It is important in assessing or examining indexation proposals to recognize three factors that account for the deficiency of most of these proposals. These are:

- (1) A lack of understanding of the factors that contribute to spontaneous change in the revenue and the equity or burden of certain taxes.
- (2) The lack of a clear policy objective upon which to build the proposal.
- (3) A lack of understanding of the nature and impact or interaction of inflation with the taxes in our tax structure.

Indexation proposals have been prompted by an awareness of and a desire to neutralize the inflation-caused, spontaneous or non-discretionary changes in the burden of various taxes and sets of taxes. But as this

study has demonstrated, inflation is not alone in causing spontaneous change in the burden and revenue of various taxes. Economic growth, for example, is one among several other forces that have a similar effect on taxes. This research indicates, therefore, that it would be more desirable to seek and articulate a policy that addressed spontaneous changes in general, not just those caused by inflation.

Indexation proposals are usually directed toward two very different policy objectives: (1) equity constancy and (2) revenue constancy. Some proposals offer a primarily automatic mechanism of correction, others a discretionary one, and most address to some degree the effect a proposal is likely to have on employment, economic growth, and resource allocation. Recent tax code changes indicate that the primary policy objectives of the Congress are revenue constancy achieved so as to obtain a desired economic stimulus and favorable political effect.

Without exception, the proposals to index taxes are in whole or in part prompted by some perceived, undesirable effect that inflation is seen to have on a tax or set of taxes, typically a progressive tax like the federal individual income tax.

But the perceived effect varies. Some see

inflation increasing tax progressivity, others see it decreasing tax progressivity. Therefore, some proposals are offered with the intent to restore the historic and more progressive character of a tax, others are offered to alleviate what is seen as the increasing burden of a tax or set of taxes. What prevails is certainly a lack of agreement, in a sense a lack of understanding, concerning the nature of the impact or interaction of inflation and taxes in general and the federal individual income tax in particular.

The finding of this research that, along with other factors, economic growth and inflation both have had an effect on tax progressivity, would indicate that those seeking equity constancy would require a broader policy framework than indexation to achieve their objective. Further, for those concerned with the declining tax progressivity of the past decade and a half, indexation alone would most likely exacerbate even accelerate the decline.

In the long run, what is needed is a method to monitor tax and expenditure progressivity and equity in much the same way employment and unemployment are monitored. This would provide the kind of information that is necessary for the formation and revision of tax and expenditure programs. In the short run we need to

extend our understanding of the interaction of taxes - all taxes - with a growing economy characterized by a moderate to high rate of price inflation.

There are certain limitations in the present study and to recognize them is to address several ways in which this research could be extended. The corporate income tax presents several special problems. Among these are (1) the relatively unsettled question of tax shifting, (2) the impact of the tax on resource allocation, and (3) the effect of various current value accounting proposals on the revenue and progressivity of this tax. Much must be done in all these areas to further our understanding of the interaction of the corporate income tax and the economy, and to aid in assessing the corrective measures, if any, that are desirable.

The payroll tax has played a large part in the changing tax progressivity of the tax structure in the United States between 1959 and 1972. However, since 1972, the payroll tax has been partially indexed and its impact on tax progressivity is certainly different than it was during the period studied. This effect could be explored to advantage.

The interaction of inflation and taxes prompted this study. Inflation proved to be a force altering the progressivity of our tax structure in important ways.

The pattern of government expenditures has been changing too, and while much has been clarified on the tax side of governmental activity, much remains to be done toward understanding both taxes and government expenditures.

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VITA

The author was born in Scranton, Pennsylvania on September 19, 1940. His parents are Albert F. Fries, Sr. and Jean MacTaggart Fries, who continue to reside in northeastern Pennsylvania. He attended public schools in the area, graduating from Scranton Central High School in June, 1958. An A.B. in Biology was received in February, 1963 and an M.B.A. in June, 1968, both conferred by Lehigh University, Bethlehem, Pennsylvania. Prior to beginning graduate study in 1966 the author taught at the Episcopal Academy in Philadelphia. In September, 1968, he began teaching at Lehigh University with a teaching assistanceship in the Accounting Department. He now teaches at the Catholic University of America in Washington, D.C. and resides with his wife Barbara and son Kevin in Gaithersburg, Maryland.