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11 Measuring Tax Burden: A Historical Perspective

B. K. Atrostic and James R. Nunns

11.1 Introduction

11.1.1 Overview

Measures of tax burden are indicators of how well tax policy meets one of its primary goals, equitably raising the revenues needed to run government. Equity has two aspects. The first, vertical equity, concerns the way taxes are distributed among taxpayers with different abilities to pay. The second, horizontal equity, concerns the way taxes are distributed among taxpayers with the same ability to pay. Tax burden measures thus answer broad economic and social questions about the effect of tax policy on the distribution of income and wealth.

The history of these measures incorporates the histories of economic and world affairs, major tax and economic policy legislation, intellectual and social movements, and data and technological innovation in the fifty years since the first meeting of the Conference on Research in Income and Wealth. This paper reviews the effect of these measures on federal tax policy in a historical and statistical context.

The variety of tax burden measures over this period reflect advances in economic and measurement theory, changing policy concerns, new data sources,

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and external social and economic forces. Advances in the theory and measurement of income, wealth, and taxes generated corresponding changes in the analytical and computational methodologies used to measure tax burden. Throughout the history of empirical tax burden measurement in the United States, changing policy concerns focused attention on different distributional questions. The changing focuses provided the impetus for new analytical techniques. New data sources, together with these techniques, in their turn suggested new views of tax burden and new directions for tax reforms. The major social and economic forces of the last fifty years as well as advances in economic theory and data development influenced evaluations of tax burden measures. The timeline in table 11.1 indicates overlaps among these developments.

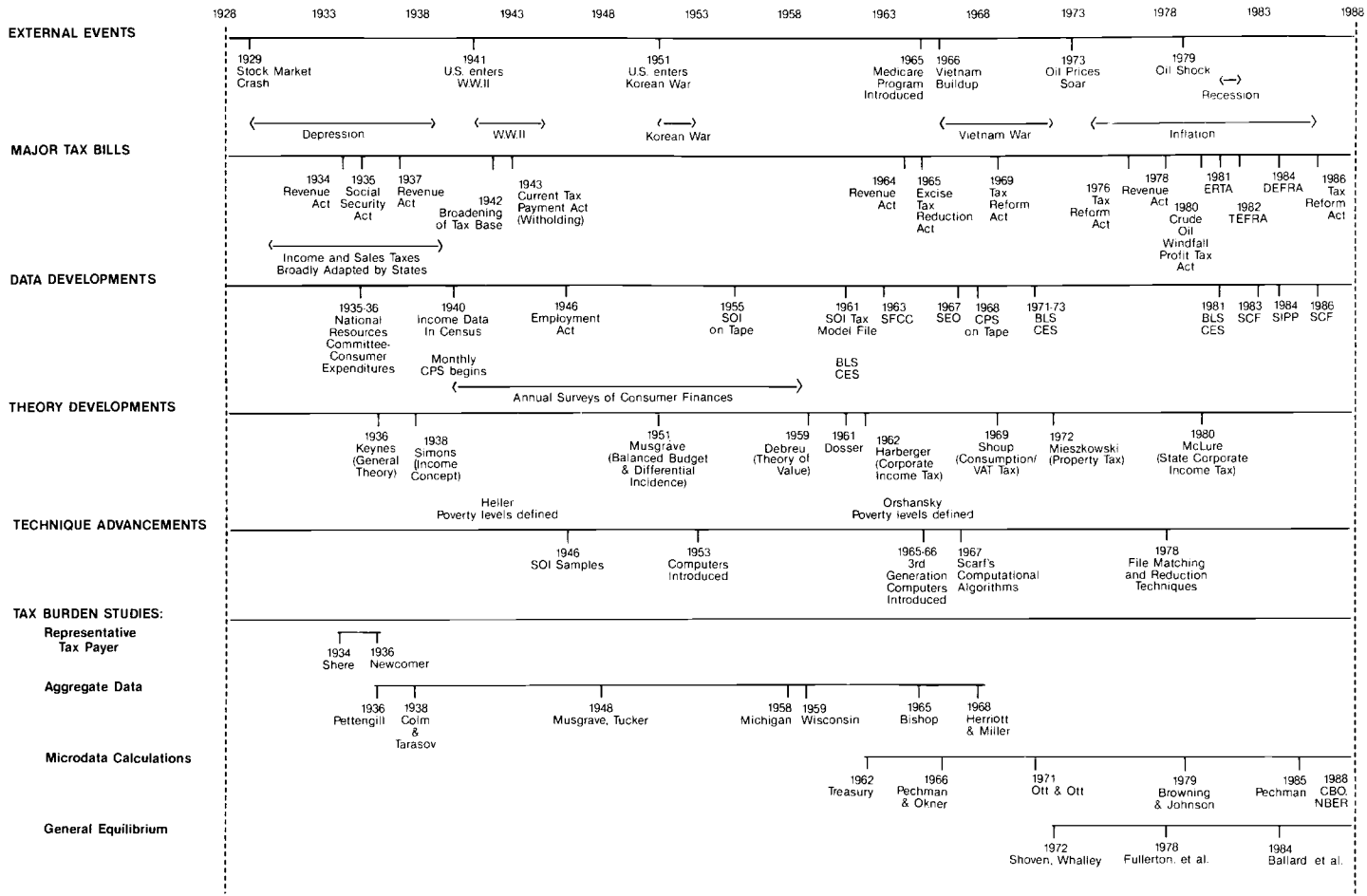
The focus throughout this paper is the interrelation among tax burden measures, the development of tax policy, and the policy implications and uses of advances in data, economic theory, and measurement. Each of these topics is treated fully elsewhere. The structure of the U.S. tax system and of the general process of tax policy formulation are discussed in Blough (1952) and Pechman (1987). Summaries and syntheses of tax incidence theory are given in Mieszkowski (1969), Whalley (1984), Musgrave (1985), and Kotlikoff and Summers (1987). Shoup (1972) assesses the state of quantitative work on tax incidence and tax burden in light of fifty years of effort by the National Bureau of Economic Research to improve quantitative research in economics. Reviews and assessments of some tax burden measures are given in Musgrave and Thin (1948), Atkinson (1980), Devarajan, Fullerton, and Musgrave (1980), Auerbach and Rosen (1980), and Kiefer (1984).

11.1.2 Tax Burden Defined

Definitions of a tax, of ability to pay, and of the burden of taxes are necessary prerequisites to measuring tax burden. A tax is a compulsory payment to the government from which the taxpayer receives no direct benefit. This definition distinguishes user charges and commercial receipts from government enterprises (e.g., state-owned liquor stores) from taxes. All three are government receipts, but only the tax component is included in tax burden studies. The inclusion of income, sales, and excise taxes generates little controversy. The appropriate treatment of property taxes and other taxes that are tied to benefits, such as the payroll taxes for Social Security and unemployment insurance, are less clear-cut. In the case of payroll taxes, individuals receive direct benefits when they qualify for the insurance payments but receive these payments at a time removed from the time the taxes were paid. Most tax burden studies include property and benefit taxes in their measures of total taxes paid.

Ability to pay is generally measured by income. The Haig-Simons income definition, a broad-based concept of net accretions to economic power (or consumption plus change in net worth), is the most common theoretical income concept (see Musgrave 1985). The actual income measures used in tax

Table 11.1 **Timeline of Major Events in the History of Tax Burden Measurement**



burden studies usually differ from a complete Haig-Simons measure. Adjusted gross income (AGI) is widely used in tax burden studies in part because it is readily available in *Statistics of Income* publications. Defined by the relevant sections of the Internal Revenue Code, AGI generally omits many components of income, such as transfer payments, and allows deductions that are not costs of doing business. Other income measures used in recent tax burden studies, such as modified economic income and family economic income, expand adjusted gross income to approximate more nearly Haig-Simons measures that are independent of current tax laws.

Definitions and measures of income and wealth are given in NBER (1937) and (1943), National Resources Committee (1938), Goldsmith et. al. (1954), and Smith (1975).

Payment of taxes, through lower factor incomes or higher product prices, reduces a taxpayer's real income. Tax burden measures attempt to quantify this decrease in utility and to evaluate the decrease against a measure of ability to pay. Taxes may impose an excess burden on the taxpayer beyond the amount of tax payments if they also induce distortions in the economic system by altering relative prices. Taxation also imposes administrative and compliance costs. With the exception of general equilibrium models, tax burden studies use taxes paid as the tax measure and attempt neither to calculate the excess burden nor to count administrative and compliance costs.

11.1.3 Approaches to Measuring Tax Burden

Tax burden studies of the 1930s are the earliest U.S. studies to include measures of taxes at all levels of government. These studies commonly present results in terms of the tax liability and income of representative taxpayers. A typical category of representative taxpayer would be married taxpayers with no dependents whose income is under $5,000 annually. This form of tax burden measure continues to be widely used in policy debates because it can be focused on particular aspects of a tax proposal and because it is most accessible to nonspecialists.

Aggregate data studies calculate the proportion of taxes paid by each income class and also the proportion of taxes to income within each class. These measures, first calculated in the early 1940s, have largely been replaced.

Current tax policy analysis relies on disaggregated general equilibrium and microdata measures, although representative taxpayer studies continue as a third strain. Both of the newer approaches make use of advances in the frequency and availability of detailed economic data from the federal statistical system.

Microdata models depend on the large amount of survey and administrative record information on individuals that became available starting in the late 1950s and the 1960s together with computer capabilities for handling large and complex data files. Applied general equilibrium models became more useful for policy analysis as computational algorithms became available that

permitted larger and more realistic models than the original analytical two-by-two models.

As analytical capabilities have grown, so too have the demands of policymakers in the number, frequency, and detail of desired analyses of the distributional consequences of specific tax proposals as well as for overviews of the entire tax structure. Microdata simulation models are the major tool that Congress and the Treasury use in examining these detailed policy questions. Constraints on the ability of these models to answer policy questions, however, continue. One constraint is the lack of sufficiently detailed data on taxes, income, wealth, and consumption for the analyses now required. In general, these data are not collected together in the same survey. Methodologies for statistical linkages between surveys continue to be topics of professional disagreement. The concerns Morgenstern (1963) raised about the false precision economists attribute to data derived from surveys and to estimates based on a series of data sources that are themselves estimates also apply to estimates of tax burden. Few statistics are presented with measures of overall reliability of the estimates. Another constraint is the practical capacities of available computer systems in providing multiple simulations, at the desired level of detail, on a daily basis during legislative consideration of tax measures.

11.1.4 Organization of the Paper

The second section of this paper provides the historical, statistical, and theoretical background to the approaches that formed tax policy over the last half century. The four major approaches to measuring tax burden, representative taxpayers, aggregate data, microdata, and applied general equilibrium, are discussed in detail in sections 11.3–11.6. The microdata model currently used at the Department of the Treasury in analyzing tax legislation is described in greater detail in section 11.7 to highlight continuing policy needs for improved capabilities for measuring income and tax burden.

11.2 Background

11.2.1 Historical Background

Assessments of the extent and distribution of tax burdens became important once income taxes became important sources of federal, state, and local revenues. Prior to the initiation of the modern federal income tax in 1913, most federal revenues came from customs duties and excise taxes. For many years after 1913, only a small number of relatively well-to-do individuals paid income tax, and subsequent legislation continued to exempt lower-income persons while raising a growing proportion of federal revenues. The four Revenue Acts of the 1920s (1921, 1924, 1926, and 1928), for example, raised personal exemptions. By the beginning of the Depression, federal personal and corporate income taxes had grown in importance and constituted about

60% of federal revenues although relatively few persons were federal taxpayers. During the 1930s, both the sources of government revenues and their shares of gross national product (GNP) changed. Income and sales taxes were broadly adopted by states. At the same time, the federal government increased its revenue demands to try to bring the budget into balance during the Depression and to finance reform and relief programs. Federal excise taxes, understood at the time to be regressive, accounted for growing proportions of revenues. By 1934, just prior to the period covered by this paper, excise taxes had grown to 61% of federal revenues and had grown in absolute terms from $1.0 billion in 1930 to $2.2 billion in 1934. The changing sources of government revenues and the growing share of taxes relative to GNP since 1929 are given in table 11.2.

The major external events of the last fifty years that affected federal tax policy are well known. The timeline of table 11.1 above gives an overview of these events and of the developments in economic theory and measurement that gave rise to new measures of tax burden. After the Depression of the 1930s came an upturn caused by a combination of the prewar military buildup and relief spending. World War II was followed by a brief bout of high inflation and by small economic downturns. Another military buildup and inflation accompanied the Korean War, followed by two downturns in the 1950s and another in 1960. The subsequent and lengthy economic expansion included the Vietnam War buildup of the late 1960s and its accompanying inflation. The 1970s brought two oil price shocks, two recessions, and continuing inflation. The deepest of the postwar recessions in 1981–82 preceded a long-awaited downturn in inflation and the current sustained expansion.

Tax policy kept pace throughout this period with the changing role of government in the economy and with changing economic circumstances. The Revenue Acts of the Roosevelt administration reviewed and somewhat reformed federal tax laws during the 1930s to accord more closely to principles of ability to pay, reduction of tax avoidance, closure of loopholes, and simplification of tax administration. The Social Security Act of 1935 established two new tax and benefit systems, Social Security and the federal-state unemployment compensation systems. Both systems were funded by payroll taxes.

At the outset of the Second World War, the need to finance a rapid military buildup and restrain growing consumer demand required estimates of the tax burden and its distribution to influence policy direction. Income tax rates could be increased selectively to staunch an increase in demand, if the income classes that consumed the items that would be in shortest supply could be identified. Selective increases in excise taxes could also slow demand.

Testimony on the Revenue Revision of 1941 by the chief of staff of the Joint Committee on Internal Revenue Taxation expressed concern about inflation arising from full employment. "The tax base should be broadened to curtail private consumption by either general or specific consumption taxes" (U.S. Cong. House Committee on Ways and Means 1941, 82). In the same series of

hearings, the administrator of the Office of Price Administration and Civilian Supply argued for taxes that would imply "positive encouragement of defense production and the discouragement of civilian consumptions of those commodities and services which compete with military demands" (642). Selective excise tax increases were endorsed along with an increase in individual income tax rates in the lower and middle income brackets (646). At the same time, policymakers were concerned that war financing not worsen inequities in the current distribution of tax burden or impose economic hardship on low-income taxpayers (e.g., Blum 1965, 318). Their concerns were reflected in the continuing series of Treasury tax burden studies (e.g., Shere 1934; U.S. Department of the Treasury 1937, 1940, 1947a, and 1947b) and in the continuing discussion of tax burden in decision making (e.g., U.S. Congress, House Committee on Ways and Means 1942; U.S. Congress, House 1942; U.S. Congress, Senate 1942; U.S. Department of the Treasury 1942).

The Revenue Act of 1942 dramatically increased the proportion of the population that would pay income tax by lowering exemptions. (The number of taxable individual income tax returns increased from 4 million in 1939 to 43 million in 1945.) Collecting the income tax through the existing estimated tax payment system created difficulties for the new taxpayers. The Current Tax Payment Act of 1943 initiated wage withholding at the source, beginning in 1944, to ease collection and also to move income from the taxpayer to the government more quickly.

The massive unemployment of the Depression raised concerns about whether the full employment during World War II would be followed by repeating either the Depression or the post-World War I inflation. One consequence of those concerns, and a clear statement of the policy influence of Keynesian principles, was the enactment of the Employment Act of 1946 in February 1946. The first of a three-part declaration of policy made it "the continuing policy and responsibility of the Federal Government to use all practicable means . . . to foster and promote useful employment opportunities . . . and promote full employment and production, and increased real income" (U.S. Congress, JEC 1981, 1). Another consequence of those concerns was the delay in tax reductions for individuals. The Revenue Act of 1945, recognizing the length of the adjustment to peacetime and the pent-up demand, kept the wartime structure of personal income and excise taxes in place. The Revenue Act of 1946 reduced income taxes somewhat by lowering tax rates and raising personal exemptions.

By the 1950s, Korean War requirements for increased defense spending and curtailed consumption raised concerns about setting off another streak of inflation in the process. As with World War II financing, an increase in income taxes was recommended. Tax burden became an important policy consideration because existing statutory federal income tax rates were high, reflecting the tax structure of World War II. Surtax rates reached 50% at an income of $16,000 and rose to a maximum of 91% in 1950. The administration's

Table 11.2 **Federal, State, and Local Taxes Relative to GNP, 1929–88**

	Taxes as a % of GNP								Nominal Taxes ($ billions)						
	Federal								Federal						
Calendar Year	Personal	Corporate	Indirect Business Taxes	Social Insurance	Total	State and Local	Total	GNP ($ billions)	Personal	Corporate	Indirect Business Taxes	Social Insurance	Total Federal Taxes	State and Local	Total taxes
1929	1.3	1.2	1.2	.2	3.8	7.3	11.1	103.9	1.3	1.2	1.2	.2	3.9	7.6	11.5
1930	1.2	.8	1.1	.2	3.3	8.6	11.9	91.1	1.1	.7	1.0	.2	3.0	7.8	10.8
1931	.8	.5	1.2	.3	2.7	10.1	12.8	76.4	.6	.4	.9	.2	2.1	7.7	9.8
1932	.5	.5	1.5	.3	2.9	12.5	15.4	58.5	.3	.3	.9	.2	1.7	7.3	9.0
1933	.9	.9	2.9	.4	5.0	12.9	17.9	56.0	.5	.5	1.6	.2	2.8	7.2	10.0
1934	.9	.9	3.4	.3	5.5	13.1	18.6	65.6	.6	.6	2.2	.2	3.6	8.6	12.2
1935	1.1	1.1	3.0	.3	5.5	12.5	18.0	72.8	.8	.8	2.2	.2	4.0	9.1	13.1
1936	1.3	1.6	2.8	.5	6.1	10.3	16.5	83.1	1.1	1.3	2.3	.4	5.1	8.6	13.7
1937	1.9	1.4	2.6	1.8	7.7	10.0	17.6	91.3	1.7	1.3	2.4	1.6	7.0	9.1	16.1
1938	1.9	1.1	2.6	2.1	7.6	10.9	18.5	85.4	1.6	.9	2.2	1.8	6.5	9.3	15.8
1939	1.3	1.4	2.5	2.1	7.3	10.5	17.9	91.3	1.2	1.3	2.3	1.9	6.7	9.6	16.3
1940	1.4	2.6	2.6	2.1	8.7	10.0	18.6	100.4	1.4	2.6	2.6	2.1	8.7	10.0	18.7
1941	1.6	5.8	2.9	2.1	12.4	8.3	20.6	125.5	2.0	7.3	3.6	2.6	15.5	10.4	25.9
1942	3.0	7.0	2.5	2.0	14.5	6.7	21.1	159.0	4.7	11.1	4.0	3.2	23.0	10.6	33.6
1943	8.6	7.1	2.5	2.2	20.3	5.7	26.0	192.7	16.5	13.6	4.9	4.2	39.2	10.9	50.1
1944	8.3	5.9	2.9	2.3	19.4	5.3	24.7	211.4	17.5	12.5	6.2	4.9	41.1	11.1	52.2
1945	9.1	4.8	3.3	2.8	20.0	5.4	25.4	213.4	19.4	10.2	7.1	5.9	42.6	11.6	54.2
1946	8.1	4.0	3.7	3.3	19.2	6.1	25.3	212.4	17.2	8.6	7.8	7.1	40.7	13.0	53.7
1947	8.3	4.5	3.3	2.6	18.8	6.5	25.3	235.2	19.6	10.7	7.8	6.1	44.2	15.4	59.6
1948	7.3	4.5	3.1	2.0	16.8	6.8	23.6	261.6	19.0	11.8	8.0	5.2	44.0	17.7	61.7
1949	6.2	3.7	3.1	2.2	15.1	7.5	22.6	260.4	16.1	9.6	8.0	5.6	39.3	19.5	58.8
1950	6.3	6.0	3.1	2.2	17.5	7.4	24.9	288.3	18.1	17.2	8.9	6.3	50.5	21.3	71.8
1951	7.8	6.5	2.8	2.2	19.4	7.0	26.4	333.4	26.1	21.7	9.4	7.5	64.7	23.4	88.1
1952	8.8	5.3	2.9	2.2	19.3	7.2	26.5	351.6	31.0	18.6	10.3	7.8	67.7	25.4	93.1
1953	8.7	5.2	2.9	2.1	18.9	7.4	26.3	371.6	32.2	19.5	10.9	7.8	70.4	27.4	97.8
1954	7.8	4.5	2.6	2.3	17.3	7.8	25.0	372.5	29.0	16.9	9.7	8.7	64.3	29.0	93.3
1955	7.7	5.2	2.6	2.4	18.0	7.8	25.8	405.9	31.4	21.1	10.6	9.9	73.0	31.7	104.7

1956	8.2	4.9	2.6	2.6	18.3	8.2	26.5	428.2	35.2	20.9	11.2	11.2	78.5	35.0	113.5
1957	8.3	4.5	2.6	2.9	18.3	8.5	26.8	451.0	37.4	20.4	11.8	12.9	82.5	38.5	121.0
1958	8.1	3.9	2.5	2.9	17.4	9.2	26.6	456.8	36.8	18.0	11.5	13.1	79.4	42.0	121.4
1959	8.0	4.5	2.5	3.2	18.3	9.4	27.7	495.8	39.9	22.5	12.5	15.7	90.6	46.6	137.2
1960	8.5	4.2	2.6	3.6	18.8	9.7	28.5	515.3	43.6	21.4	13.4	18.5	96.9	50.0	146.9
1961	8.4	4.0	2.5	3.6	18.5	10.1	28.7	533.8	44.7	21.5	13.6	19.2	99.0	54.1	153.1
1962	8.5	3.9	2.5	3.7	18.7	10.2	28.9	574.6	48.6	22.5	14.6	21.5	107.2	58.6	165.8
1963	8.5	4.1	2.5	4.0	19.0	10.4	29.5	606.9	51.5	24.6	15.2	24.3	115.6	63.4	179.0
1964	7.5	4.0	2.5	3.9	17.9	10.7	28.6	649.8	48.6	26.1	16.1	25.4	116.2	69.8	186.0
1965	7.6	4.1	2.3	3.8	17.8	10.7	28.5	705.1	53.9	28.9	16.4	26.6	125.8	75.5	201.3
1966	8.0	4.1	2.0	4.5	18.6	11.0	29.6	772.0	61.7	31.4	15.5	34.9	143.5	85.2	228.7
1967	8.3	3.7	2.0	4.8	18.7	11.5	30.2	816.4	67.5	30.0	16.2	38.9	152.6	94.1	246.7
1968	8.9	4.0	2.0	4.8	19.8	12.1	31.9	892.7	79.7	36.1	17.9	43.2	176.9	107.9	284.8
1969	9.9	3.7	2.0	5.1	20.7	12.5	33.3	963.9	95.1	36.1	18.9	49.6	199.7	120.8	320.5
1970	9.1	3.0	1.9	5.2	19.2	13.4	32.6	1,015.5	92.6	30.6	19.2	52.9	195.3	135.8	331.1
1971	8.2	3.0	1.8	5.3	18.4	13.9	32.3	1,102.7	90.3	33.5	20.3	58.7	202.8	153.6	356.4
1972	8.9	3.0	1.6	5.6	19.1	14.8	33.9	1,212.8	108.2	36.6	19.9	67.5	232.2	179.3	411.5
1973	8.4	3.2	1.6	6.2	19.4	14.4	33.8	1,359.3	114.7	43.3	21.1	84.6	263.7	196.4	460.1
1974	8.9	3.1	1.5	6.5	20.0	14.5	34.4	1,472.8	131.3	45.1	21.6	95.9	293.9	213.1	507.0
1975	7.9	2.7	1.5	6.4	18.4	15.0	33.4	1,598.4	125.9	43.6	23.8	101.6	294.9	239.6	534.5
1976	8.3	3.1	1.3	6.5	19.1	15.2	34.2	1,782.8	147.3	54.6	23.3	115.0	340.2	270.1	610.3
1977	8.5	3.1	1.3	6.4	19.3	15.1	34.4	1,990.5	169.8	61.6	25.0	127.7	384.1	300.1	684.2
1978	8.7	3.2	1.2	6.5	19.6	14.7	34.3	2,249.7	194.9	71.4	28.0	147.0	441.3	330.3	771.6
1979	9.2	3.0	1.2	6.8	20.1	14.2	34.3	2,508.2	231.0	74.4	29.3	170.3	505.0	355.3	860.3
1980	9.4	2.6	1.4	6.8	20.3	14.3	34.5	2,732.0	257.9	70.3	38.8	186.8	553.8	390.0	943.8
1981	9.8	2.2	1.8	7.2	21.0	13.9	34.9	3,052.6	298.9	65.7	56.2	218.8	639.6	425.6	1,065.2
1982	9.6	1.5	1.5	7.4	20.1	14.2	34.3	3,166.0	304.5	49.0	48.1	233.7	635.3	449.4	1,084.7
1983	8.6	1.8	1.5	7.4	19.4	14.3	33.7	3,405.7	294.5	61.3	51.6	252.5	659.9	487.6	1,147.5
1984	8.2	2.0	1.5	7.5	19.2	14.3	33.6	3,772.2	310.3	75.2	55.7	284.7	725.9	540.4	1,266.3
1985	8.6	1.9	1.4	7.7	19.7	14.5	34.1	4,010.3	346.6	76.1	55.2	310.6	788.5	579.7	1,368.2
1986	8.6	2.0	1.2	7.8	19.5	14.6	34.1	4,235.0	363.0	83.7	50.9	329.8	827.4	618.8	1,446.2
1987	9.0	2.4	1.2	7.8	20.4	14.6	35.0	4,488.5	403.7	109.4	54.1	348.4	915.6	651.1	1,566.7
1988[a]	8.2	2.8	1.2	8.1	20.2	14.5	34.7	4,830.0	397.0	133.4	56.2	389.0	975.6	700.3	1,676.0

Source: U.S. Department of Commerce. Bureau of Economic Analysis. 1988. National Income and Product Accounts of the United States, 1929–1982. Statistical Tables, 1986; and *Survey of Current Business* (May).

[a]denotes estimate.

proposal would have raised these rates to 54% and 95% respectively (U.S. Congress, Senate 1951). The existing structure had provoked enough public displeasure over the preceding 15 years that at least 25 states adopted resolutions calling for a constitutional amendment to cap effective rates at 25% on income, estate, and gift taxes (U.S. Congress, JCER and Select Committee on Small Business 1952). A series of tax burden studies entered the debate on several Revenue Acts (Musgrave et al. 1951; Tucker 1951; U.S. Congress, JCER 1951; Colm and Wald 1952). The Revenue Act of 1951 nevertheless raised tax rates, but not to the full extent of the administration proposal.

The tax burden studies of the early 1950s generated heated debate among economists. At the same time, objections to conflicting assumptions in statistical computations of the tax burden opened further avenues of debate (Prest 1955). The return to a peacetime economy in the mid-1950s, together with two recessions in that decade, continued to place tax policy among the leading economic policy tools and tax burden, therefore, among the leading policy questions. A major review of federal income tax provisions was conducted in a series of congressional hearings in 1959. The published report of those hearings dedicated a quarter of its 2,400 printed pages to the individual income tax and its distributive consequences (U.S. Congress, House Committee on Ways and Means 1959). The postwar Internal Revenue Code, however, remained largely unaltered through a major recodification in 1954, apart from surtaxes imposed permanently during the Korean War.

By 1963, the level and structure of taxes were perceived to be sufficient impediments to full employment and economic growth that President Kennedy's State of the Union Address deemed "a substantial reduction and revision in Federal income taxes" to be "the most urgent task confronting the Congress in 1963." The Revenue Act of 1964 embodied some of the reforms in the President's Tax Message of 1963 by lowering tax rates across the board and lowering overall tax liabilities. It also set the tax-free income level (by adjusting the personal exemption and the standard deduction) to correspond to the official poverty level so that the poor would be exempt from federal income tax. The Excise Tax Reduction Act of 1965 continued reforms by repealing many excise taxes and lowering excise tax rates raised during the Korean War. A Vietnam War financing surtax applied from 1968 to 1970.

Inflation adjustments were reflected in the changes of the Revenue Act of 1969, which instituted a schedule to raise personal exemptions and standard deductions over the following several years. The Tax Reform Act of 1976 raised deductions, increased the capital gains rate, increased the minimum tax rate, and lowered the minimum tax exemption. Tax acts of the late 1970s adjusted exemptions and widened tax brackets in response to inflation-induced bracket creep. The Crude Oil Windfall Profit Tax, essentially an oil profits surtax, was enacted in 1980. The Economic Recovery Tax Act of 1981 (ERTA) lowered tax rates, introduced inflation indexing, and lowered the maximum rates on capital gains. Both the Tax Equity and Fiscal Responsibility Act (TEFRA) in 1982 and the Deficit Reduction Act (DEFRA) in 1984

responded to growing federal deficits by raising additional revenues. Most recently, the Tax Reform Act of 1986 broadened the tax base, lowered tax rates, and raised tax thresholds above the poverty level for most taxpayers while maintaining revenue neutrality.

11.2.2 Statistical and Theoretical Background

The heavy data demands of tax burden measures confronted the same scarcity of data as did other policy needs in the 1930s. The integral link between measures of income and wealth and tax burden are clearly shown in the proceedings of the first Conference on Research in National Income and Wealth (NBER 1937). The treatment of tax revenues in the measurement of income, tax incidence, and distinctions between taxable income and national income were discussed in papers and comments by Shoup, Blough, Colm, and Newcomer. One major data gap, for tax burden measurement as well as for other social and economic policy development, was an estimate of the distribution of income. A review of data sources for constructing a size distribution of income noted serious gaps, including "No continuous source yields a distribution by size of either family or individual income for the United States. . . . In the absence of complete coverage, a good sample would meet the chief needs. That we are far from such a goal is obvious" (NBER 1943, p. 84). Income tax–return data themselves were a crucial component of estimates of the upper tail of that distribution whose other major component was a 1935–36 survey of consumer purchases (see Baird and Fine 1939).

In response to the absence of vital data, among other reasons, the Office of Statistical Standards was established in the Bureau of the Budget in 1939. Congressional concern over data needed for policy analysis was reflected in debate preceding the Employment Act of 1946 and in its provisions. To help effect its goals, the act required the president to submit a semiannual economic report to Congress. The act also established the Council of Economic Advisers to the President, whose responsibilities included assisting in the preparation of the President's Economic Report, and the Joint Committee on the Economic Report (now the Joint Economic Committee) whose responsibilities included advising Congress with respect to the President's Economic Report, in part by submitting its own reviews of the report. One thread of the debate on the passage of this act was the lack of timely and detailed data on employment, expenditures, and prices. The Joint Committee on the Economic Report (JCER) quickly set up the Subcommittee on Economic Statistics in 1947 to review the existence and timeliness of economic data necessary to make and evaluate federal economic policy. One of the subcommittee's first acts was to issue a brief report on statistical gaps in 1948 (U.S. Congress JCER 1948). Efforts at filling the gaps noted in the subcommittee report on statistical gaps were detailed in subsequent Economic Reports of the President. The Subcommittee on Economic Statistics itself continued to hold hearings and publish detailed reports (see, e.g., U.S. Congress, JCER 1954).

The National Income and Product Accounts (NIPA—themselves dependent

on growing data availability), new consumer budget and finances studies, the addition of income data to the 1940 decennial census, and the Statistics of Income program contributed some of the basic data necessary for calculating measures of tax burden. By the 1950s, exclusions from taxable income such as fringe benefits had grown in importance. Data on income, consumption, and taxes of individuals, rather than aggregates by income class, were required to examine concerns that these exclusions were distributed unevenly among taxpayers with similar incomes.

Filling the data gaps was a slow process, however, and the lack of data became a recurring theme of both researchers attempting to measure tax burden and policy users of those measures. Neither the data themselves nor the technology to access and link large samples of individual records were available until the mid-1960s. The first item listed in the Subcommittee on Economic Statistics' 1948 report on statistical gaps was data on individual income, expenditure, and savings patterns, data required to analyze "the effect of possible [postwar] tax reductions on consumer demand and savings" (U.S. Congress, JCER 1948, 20). Income data were collected in the decennial census for the first time in 1940. The 1936 Survey of Consumer Purchases remained the most recent large-scale national survey of income, expenditures, and savings until the results of the 1950–51 expenditure survey became available in the mid-1950s. The postwar expenditure studies available for tax policy decision making during the Korean War were limited to certain income groups and narrow areas in any single year. Annual Surveys of Consumer Finances, while national in scope, were based on samples too small to permit detailed analysis at subnational levels and did not collect asset data.

Rapid advances in computer technology accompanied by declining prices for given levels of computer performance (Triplett 1989) made computers increasingly available and affordable research tools. The advent of the computer age in the mid-1950s coincided with growing concerns about horizontal equity within the tax system (see Colm and Wald 1952), and provided the first practical means of addressing this question. But implementing that tool took several years. The first tax burden calculations based on the Statistics of Income microdata were run on these early machines in the early 1960s. While the studies were now possible, they were time consuming and costly.

Third-generation computing technology introduced in 1965 provided much-improved price/performance ratios compared to the earlier technologies. At the same time, new large-scale surveys (such as the Survey of Economic Opportunity [SEO]) were undertaken, and both these and existing surveys (such as the Current Population Survey [CPS]) became available as public-use computer tapes in the late 1960s. Increased computer performance characteristics such as speed and memory size began to make research using these large surveys feasible, whether the surveys were used alone or in research linking information among multiple surveys. The first estimates of horizontal equity in a tax burden study, Pechman and Okner (1974), required both

the SEO and the CPS and advanced computer technology. Continuing increases in computer performance make large-scale microsimulation models inexpensive and fast enough for daily use in the making of tax policy.

Advances in statistical techniques and theory reduced the resources needed to make statistical matches between individual records in multiple microdata files. The development of efficient computational algorithms (Scarf 1967) made applied multisector general equilibrium models practical for research.

Tax burden measurement depends as well on prevailing economic theory. Keynes's General Theory, introduced in 1936, contributed new ideas for government fiscal policy that were soon adopted. The preferred public finance definition of income against which tax burden should be measured had been discussed by Haig in the 1920s but received new attention in Simon's restatements in 1938 and 1950.

A general proof of the existence of competitive equilibrium was first provided by Debreu in 1959. Shortly thereafter, Harberger (1962) presented a theory of corporate tax incidence in a general equilibrium setting. The role of economic growth and dynamic principles generally in the context of tax incidence were first stated by Dosser (1961). A separate strain of general-equilibrium models that considered the dynamics of the adjustments between general equilibria followed from Dosser's work.

Tax incidence theory determines how the burden of a tax should be allocated among economic units; the burden may fall on units other than those specified in tax statutes. Incidence therefore is an integral theoretical component of any tax burden measure. Continuing developments in incidence theory brought corresponding changes in tax burden measures. One important advance was the distinction, drawn by Musgrave in 1951, between two alternative ways of thinking about the joint effect of the taxes imposed by the government and the spending financed by them: balanced-budget incidence and differential incidence. Balanced-budget incidence combines the effect on taxpayers of taxation and of government spending on goods and services financed by that taxation. Differential incidence holds government expenditures constant, and compares one tax structure with another yielding equal revenues. The comparison tax structure is typically a flat-rate income tax or a lump-sum tax.

The incidence of value-added and expenditure or consumption taxes was analyzed by Shoup (1969). A revision of the standard view of the incidence of the property tax was introduced by Mieszkowski (1972), and revisited recently (Mieszkowski and Zodrow 1984). McLure (1980) provided a theory of the incidence of the state corporate income tax. Dynamic concerns, including tax incidence over the life cycle and during the course of adjustment between two equilibria, have received increasing attention (Hall 1968; Feldstein 1974; Kotlikoff and Summers 1979). As recent surveys of this literature show (Musgrave 1985; Kotlikoff and Summers 1987), incidence theory continues to evolve, and the theory of the incidence of many taxes is far from settled.

11.3 Representative Taxpayer Studies

11.3.1 Summary

Representative taxpayer studies draw together data on the income, consumption patterns, and tax payments of categories of taxpayers. The categories are chosen either for their generality (e.g., the employed head of a family whose spouse is not employed outside the home, with an average number of dependent children), or their specificity (e.g., the class of taxpayer widely believed to be unfairly benefited or harmed by patterns of taxation). Representative taxpayer burden measures may compare only one kind of tax payment or all taxes at all levels of government across different categories of representative taxpayers. The tax measures may be rate schedules, actual dollars paid (on average or at the break point of a tax bracket), or taxes as a percentage of income. The earliest empirical tax burden studies that include the full range of federal, state, and local taxes examine the tax liabilities of representative taxpayers. Such a study (Shere 1934) appears first to have been conducted as part of a U.K. Treasury Department review of the federal tax system in 1934 at the beginning of Morganthau's era as Secretary of the Treasury (Blum 1959; Shoup 1972). The methodology in that study is similar to Newcomer's (1937a), whose work is the earliest published modern tax burden study to include taxes at all levels. Prior U.S. analyses typically explored instead the circumstances of hypothetical taxpayers, although attempts at empirical measures had been made in Great Britain since 1756 (Newcomer 1937a), and a study of all central government taxes in the United Kingdom had recently been completed (Report of the Committee on National Debt and Taxation [U.S. Parliament 1927], known as the Colwyn Commission Report). Studies in the United States lagged behind in part because income and excise taxes played a relatively lesser role in U.S. revenues until the Depression and in part because the necessary data simply did not exist.

Although the representative taxpayer is the oldest form of empirical tax burden measure and has numerous drawbacks, it has not been completely replaced by more recent methodologies. To the contrary, studies of the tax burden of representative taxpayers continue to the present, most recently entering the debate preceding and following the Tax Reform Act of 1986. Reasons why this form persists despite its drawbacks are straightforward. For both policymakers and their constituents, examples of the tax burden (however measured) of representative taxpayers have obvious intuitive appeal. Moreover, for tax provisions that are believed or intended to affect one group more than another, these comparisons can be focused on the specific provisions (subject always to caveats about the effects of alternative income definitions and incidence assumptions).

11.3.2 Data

The early representative taxpayer studies comment on the scarcity of the necessary income, wealth, and consumption data. Shere (in 1934) and New-

comer (in 1937) rely primarily on income data from the Statistics of Income, the National Resources Committee, the National Industrial and Conference Board, and the study by Loven, Moulten, and Warburton. State tax and property ownership data were readily available only for states for which tax burden studies existed (New York, for Shere and Newcomer and Illinois, as well, for Newcomer). Expenditure data, such as it was, came from small-scale surveys, typically conducted by the Bureau of Labor Statistics (BLS). Shere notes, "The chief deficiency in our present study is the lack of a Census of Consumption, by classes of people on basis of age, occupation, size of income, etc" (1934, R-3). Both Shere and Newcomer depend on expenditure distributions for subsets of the population based on surveys as much as 15 years old "because of the lack of statistical information" (Shere 1934, R-3). Absent data, they relied on assumptions about likely distributions of consumption and expenditure across income classes.

11.3.3 Assumptions and Results

The studies by Shere (1934) and Newcomer (1937) share similar, although not identical, methodologies and reach similar conclusions about the tax structure of the mid-1930s. The following characterization of the structure and conclusions of this class of tax burden study is based on Newcomer's study. Reflecting the diversity in the theory of tax incidence and tax shifting, tax burdens are calculated under alternative sets of incidence assumptions. For most taxes, the incidence assumptions are stable. Personal income taxes generally are assumed to be borne by the payer, business net income and capital stock taxes are borne by stockholders or owners, stock transfer taxes are borne by the taxpayer, and mortgage taxes are born by the individual who mortgages the property. Alternative assumptions are made for land taxes, payroll taxes, and a category consisting of taxes on improvements, gross receipts, commodities, motor vehicles, and motor fuels. In the alternatives, these taxes are shifted to the final consumer, or shifted in various proportions between the taxpayer and the final consumer (and the seller or employer, for receipts and payroll taxes). The resulting tax burdens are calculated for a family of four in each income class, both in dollars and as a percentage of income. Portions of representative summary tables from Newcomer's study are reproduced in table 11.3. Federal and state taxes (in the example given, for the state of New York only) and incomes are shown separately for families in 10 income classes under five sets of incidence assumptions. Taxes also are shown as a percentage of income.

Based on detailed, tax-by-tax analyses, Newcomer concludes that the tax system "as a whole is regressive for those income groups not subject to income and death taxes. The regressive elements appear to be more numerous . . . than the progressive elements at the lower end of the income scale," while the system is "progressive for the income groups subject to income and death taxes," which were the five upper-income groups (1937b, 41).

Part A of table 11.3 reports estimates of total tax burden, including federal,

Table 11.3

A. Total Tax Burden, Federal, State, and Local, Based on Assumptions in Series I (in % of income)

	A	B	C	D	E	F	G	H	I	J
Federal and New York total	12.0	10.9	9.8	18.6	17.2	20.8	23.9	31.6	44.3	84.5
Direct	7.4	6.5	5.3	11.7	10.7	10.4	18.0	11.0	23.7	55.6
Shifted	4.6	4.4	4.5	6.9	6.5	10.4	5.9	20.6	20.6	28.9
Federal total	1.6	1.4	1.3	3.1	2.6	5.9	5.2	16.9	27.0	66.1
Direct	.2	.2	.4	.5	.4	.9	3.7	3.9	14.0	46.6
Shifted	1.4	1.2	.9	2.6	2.2	5.0	1.5	13.0	13.0	19.5
State and local total	10.4	9.5	8.5	15.5	14.6	14.9	18.7	14.7	17.3	18.4
Direct	7.2	6.3	5.0	11.2	10.3	9.5	14.3	7.1	9.6	9.0
Shifted	3.2	3.2	3.5	4.3	4.3	5.4	4.4	7.6	7.7	9.4

B. Potential Incomes under Different Assumptions of Series I–V (in $)

Series:										
I and V	500	1,000	2,000	972	1,944	5,106	4,864	23,591	116,023	1,319,015
II and III	527	1,033	2,047	972	1,944	5,151	5,095	25,119	119,663	1,382,718
IV	551	1,068	2,106	986	1,972	5,217	5,266	25,315	121,620	1,397,586

C. Total Tax Burden, Federal, State, and Local, Based on Assumptions in Series I, II, III, IV, and V (in $)

Federal:										
Series I	8	14	25	30	50	300	254	3,999	31,308	872,315
Series II	6	9	17	17	30	264	221	3,919	31,085	871,578
Series III	6	9	17	17	30	264	221	3,919	31,085	871,578
Series IV	6	9	17	17	30	264	221	3,919	31,085	871,578
Series V	8	14	25	30	50	300	328	5,138	46,236	1,110,215
State and Local:										
Series I	52	95	170	151	284	761	910	3,460	20,123	242,282
Series II	73	109	181	133	246	703	1,025	3,760	21,577	284,044
Series III	73	109	181	133	246	703	1,025	3,760	21,577	284,044
Series IV	99	154	260	157	294	825	1,246	4,156	24,534	308,909
Series V	52	95	170	151	284	761	915	3,676	23,736	329,336
All:										
Series I	60	109	195	181	334	1,061	1,164	7,459	51,431	1,114,597
Series II	79	118	198	150	276	967	1,246	7,679	52,662	1,155,622
Series III	79	118	198	150	276	967	1,246	7,679	52,662	1,155,622
Series IV	105	163	277	174	324	1,089	1,467	8,075	55,619	1,180,487
Series V	60	109	195	181	334	1,061	1,243	8,814	69,972	1,439,551

Source: Reproduced from Newcomer (1937b, 28–29).
Note: Column headings A–J refer to income classes. Series I–V assumptions are sets of alternative tax incidence assumptions.

state, and local taxes, for New York families in various income classes, under one of the five sets of incidence assumptions. Total tax burden declines from 12.0% of income for the lowest income families to 10.9% and 9.8% for the next two income classes. After rising to 18.6% for the fourth income class, tax burden drops to 17.2% in the fifth class before becoming strictly progressive (from 20.8% to 84.5%) in the upper five classes. Neither the federal nor the combined state and local tax burden is progressive in the lower income classes, but the federal burden is clearly progressive for higher incomes. The pattern of tax burden for state and local taxes is less clear-cut, declining from 10.4% for the lowest income class to 8.5% for the third, then fluctuating between 14.6% and 18.7% over the upper seven income classes.

11.3.4 Policy Uses

Both varieties of representative taxpayer studies entered directly into tax policy formation in the mid-1930s and continue their influence to the present, as examples from the earlier and current eras illustrate. The report of the House of Representatives on its version of the Revenue Bill of 1934 addressed the combined effects of proposed changes in tax rates on earned and dividend income on single and married taxpayers with various levels and sources of net income and concluded that the proposals would both raise revenue and "at the same time distribute the tax burden more equitably" (U.S. Congress, House 1934, 7). One example of a representative taxpayer comparison, reproduced in table 11.4, shows the estimated effects of these proposals on a single man and on a married man with no dependents.

The representative taxpayer concept remains in use, as evidenced by table 11.5, which is from the *General Explanation* of the Economic Recovery Tax Act of 1981 (U.S. Congress, JCT 1981). Tax liabilities under prior law and under the act are compared for five categories of taxpayers in each of nine income levels.

11.3.5 Problems

The representative taxpayer approach has several limitations that were well-known by early researchers. Nothing inherent in the representative taxpayer approach ensures that the examples typify either all taxpayers or affected taxpayers rather than arbitrary choices. Supplemental data on the distribution of taxpayers by categories are needed to assess one dimension of representativeness. The representative taxpayer approach also cannot address questions of horizontal equity because variations in the income sources, consumption patterns, and tax burden of taxpayers within any category cannot be incorporated. In evaluating possible horizontal equity effects of variations in consumption patterns, Newcomer (1937b, 7–8) concluded that "there is no reason to suppose, however, that these expenditures will so successfully counterbalance one another that tax burden will be much the same for all, and no claim

Table 11.4 **Comparison of Present and Proposed Tax Amount Paid in Taxes ($)**

	If All Earned Income[a]		If Half Earned Income and Half Dividends[b]		All Dividends[b]	
Net income ($)	Present Law	Proposed	Present Law	Proposed	Present Law	Proposed
Single male:						
2,000	40	32	0	0	0	0
3,000	80	68	20	8	0	0
3,500	100	86	30	18	0	0
4,000	120	104	40	28	0	0
4,500	140	122	50	38	0	0
5,000	160	140	60	48	0	0
6,000	240	216	80	108	0	40
7,000	330	292	110	166	10	80
8,000	420	368	140	224	20	120
9,000	510	448	170	282	30	160
10,000	600	538	200	350	40	210
12,000	800	728	320	496	80	320
14,000	1,020	938	460	662	140	450
16,000	1,260	1,168	620	848	220	600
18,000	1,520	1,428	800	1,068	320	780
20,000	1,800	1,728	1,000	1,328	440	1,000
25,000	2,640	2,648	1,640	2,148	880	1,720
30,000	3,600	3,708	2,400	3,108	1,440	2,580
40,000	5,920	6,148	4,320	5,348	2,960	4,620
50,000	8,720	9,098	6,720	8,098	4,960	7,170
60,000	12,020	12,558	9,620	11,358	7,460	10,230
70,000	15,820	16,498	13,020	15,098	10,460	13,770
80,000	20,120	20,948	16,920	19,348	13,960	17,820
100,000	30,220	31,168	26,220	29,168	22,460	27,240
200,000	86,720	87,638	78,720	83,638	70,960	79,710
500,000	263,720	264,608	243,720	254,608	223,960	244,680
1,000,000	571,220	572,088	531,220	552,088	491,460	532,160

can be made that these detailed expenditures and the tax burden resulting from them are typical of the income group in question. These specific consumption taxes are not, however, a large part of the tax burden for any income group." In general, Newcomer states that, in addition to variations resulting from alternative incidence assumptions, (1937b, 10) "substantial variations [in estimated tax burdens] might be obtained by reasonable variations in the assumptions concerning the nature of income, expenditure, and property." A final problem is that the income measure against which tax burden is assessed, particularly in earlier studies, generally is a measure of income subject to tax. This income measure varies with tax law. In the absence of additional information about all income sources, taxpayers could change income classes

Table 11.4 *(Continued)*

Net income ($)	If All Earned Income[a]		If Half Earned Income and Half Dividends[b]		All Dividends[b]	
	Present Law	Proposed	Present Law	Proposed	Present Law	Proposed
Married male, no dependents:						
3,000	20	8	0	0	0	0
3,500	40	26	0	0	0	0
4,000	60	44	0	0	0	0
4,500	80	62	0	0	0	0
5,000	100	80	0	0	0	0
6,000	140	116	20	8	0	0
7,000	210	172	50	46	10	20
8,000	300	248	80	104	20	60
9,000	390	328	110	162	30	100
10,000	480	408	140	220	40	140
12,000	680	583	220	351	80	235
14,000	900	778	340	502	140	350
16,000	1,140	993	500	673	220	485
18,000	1,400	1,228	680	868	320	640
20,000	1,680	1,498	880	1,098	440	830
25,000	2,520	2,348	1,520	1,848	880	1,480
30,000	3,480	3,378	2,280	2,778	1,440	2,310
40,000	5,800	5,743	4,200	4,943	2,960	4,275
50,000	8,600	8,633	6,600	7,633	4,960	6,765
60,000	11,900	12,003	9,500	10,803	7,460	9,735
70,000	15,700	15,868	12,900	14,468	10,460	13,200
80,000	20,000	20,258	16,800	18,659	13,960	17,190
100,000	30,100	30,358	26,100	28,358	22,460	26,490
200,000	86,600	86,783	78,600	82,783	70,960	78,915
500,000	263,600	263,708	243,600	253,708	223,960	243,840
1,000,000	571,100	571,158	531,100	551,158	491,460	531,290

Source: Reproduced from U.S. Congress. House. 1934. Report of Mr. Doughton, 6–7. *The Revenue Bill of 1934*. 73rd Cong., 2d sess. H. Report no. 704, 6–7.

[a]Earned income means wages, salaries, professional fees, or other amounts received for personal services actually rendered.

[b]Dividends from stock of domestic corporations. Same treatment is accorded interest from partially tax-exempt government bonds.

when the tax law definition of income changed, without there being any change in their pretax ability to pay. Comparisons within income classes of the tax burdens of representative taxpayers under significant changes in the law would be inconsistent and misleading. Furthermore, if the proportion of total income subject to tax under a given tax law varies by income group, evaluations of progessivity would be incorrect.

Table 11.5 **Comparisons of Federal Individual Income Tax Burdens Under Prior Law and under the Act for Tax Year 1984 (Tax Liability [$])[a]**

	Single Person			One-earner Married Couple with No Dependents			One-earner Married Couple with Two Dependents			Two-earner Married Couple with No Dependents[c]			Two-earner Married Couple with Two Dependents[c]		
Income[b] ($)	Under Prior Law	Under the Act	Reduction	Under Prior Law	Under the Act	Reduction	Under Prior Law	Under the Act	Reduction	Under Prior Law	Under the Act	Reduction	Under Prior Law	Under the Act	Reduction
5,000	250	193	57	0	0	0	−500	−500	0	0	0	0	−500	−500	0
10,000	1,177	915	262	702	539	163	374	291	83	702	504	198	374	261	113
15,000	2,047	1,572	475	1,625	1,253	372	1,233	952	281	1,625	1,193	432	1,233	900	333
20,000	3,115	2,392	723	2,457	1,885	572	2,013	1,549	464	2,457	1,795	662	2,013	1,469	544
30,000	5,718	4,385	1,333	4,477	3,443	1,034	3,917	3,003	914	4,477	3,278	1,199	3,917	2,838	1,079
40,000	8,886	6,827	2,059	7,052	5,434	1,618	6,312	4,874	1,438	7,052	5,154	1,898	6,312	4,615	1,697
50,000	12,559	9,673	2,886	10,183	7,825	2,358	9,323	7,165	2,158	10,183	7,413	2,770	9,323	6,753	2,570
60,000	16,392	12,839	3,553	13,602	10,456	3,146	12,634	9,706	2,928	13,602	9,886	3,716	12,634	9,211	3,423
100,000	31,792	27,155	4,637	28,878	22,896	5,982	27,878	22,056	5,822	28,878	21,846	7,032	27,878	21,006	6,872

Source: Reproduced from U.S. Congress JCT (1981, 26), table IV-4.

[a]Includes the impact of the rate reductions and the deductions for two-earner married couples. Other individual income tax provisions not reflected here are indexing, the child care and dependent care credit, charitable contributions for nonitemizers, rollover period for sale of residence, and changes in the taxation of foreign earned income. Assumes that deductible expenses are 23% of income.

[b]Assumes that all income is wage and salary or self-employment income.

[c]Assumes lesser earning spouse earns 25% of combined income.

11.4 Aggregate Data Studies

11.4.1 Summary

Aggregate data measures of tax burden add two extensions to representative taxpayer analysis. The first extension uses estimates of the distribution of income and "allocators" of tax burden, such as consumption of taxed goods, by size class to calculate the distribution of total taxes paid by each income class. Comparisons of the distribution of taxes to the distribution of income allow evaluations of the overall progressivity or regressivity of the tax system. The second extension includes all federal, state, and local taxes through aggregated reports of taxes collected across the Nation rather than relying on a few illustrative (although carefully researched) states. (Pechman's 1951 comparison of federal income tax burdens in 1941 and 1947 is one of the few major aggregate data studies that examines only one tax source.)

Newly available income distribution data made aggregate data studies possible beginning in 1940. Aggregate data studies were used in setting tax policy throughout the 1940s and 1950s. These measures continued to be calculated through the 1960s (Bishop 1967; Herriot and Miller 1971a, 1971b) and continue to be used in making policy at the state level. In federal tax policy analysis, they have largely been replaced by microdata studies that allow more detailed analyses and estimates of horizontal equity.

11.4.2 Data

The unpublished Shere report (Shere 1934) calculated total national tax burdens as a proportion of income and wealth from 1899 to 1933 based on national income and wealth series developed by the National Industrial Conference Board. Distributions of income and wealth, and therefore of tax burden, were not calculated.

Pettengill (1940) extended Newcomer's study of the tax burden of representative taxpayers to develop a distribution of total tax burden across income classes. The extension depended heavily on a "fortunate coincidence" (1940, 62) in the years covered by Newcomer's study and by the National Resources Committee report on the distribution of consumer incomes in the United States, 1935–36 (Baird and Fine, 1939).

Colm and Tarasov (1941), another early aggregate data study, notes that actual statistics on the desired data rarely exist for the categories required for the analysis. Lacking these data, researchers use estimates based on other data sources to distribute estimates of total taxes and income across income groups, where the estimated totals themselves might be based on relatively small samples. "Yet it is frankly admitted that this is an experimental approach that requires further refinement. It is hoped that the 1940 Census of Population, in conjunction with a more detailed analysis of the 1939 income tax returns, will permit more accurate statistics on the distribution of incomes than the one used in the present report" (1941, 2).

Consider, for example, only the basic data sources listed by Colm and Tarasov (1941). (The lists of the supplementary general material and special topics—often specific state studies—are at least as long.) The National Resources Committee provided data on consumer incomes and expenditures and on the structure of the American economy. The Commerce Department provided data on state income payments and national income and other financial statistics of state and local governments, along with the wonderful miscellany of the statistical abstract. Estimates of federal, state, and local revenues were provided by the Treasury, along with data on individual and corporate income tax returns through the Statistics of Income. The Social Security Board provided information on median wages of covered workers. The BLS provided data on urban consumer purchases.

The creation of the Joint Committee on the Economic Report and its Subcommittee on Economic Statistics reflected widespread awareness of the fragmented state of data needed for policy-making. By 1949, when Musgrave et al. (1951) studied the distribution of tax burden in 1948, the situation was little improved, with the available evidence "discouragingly scarce" (1), and in some cases imposing "limitations [that] are appalling" (8). As Pechman noted in commenting on the debate about the Musgrave study, the available data were at best "recalcitrant," with "no officially recognized annual distributions of income and consumption by income classes, let alone tax distributions which depend on these basic data" (Pechman 1951, 204). Income data were taken from the 1949 Survey of Consumer Finances, with expenditure totals derived as residuals from reported income less income taxes and savings. Expenditure distributions, required for the distribution of sales and excise taxes, were derived from BLS budget studies for a limited number of cities.

Long-standing reconciliation problems among survey data (such as the Survey of Consumer Finances), administrative record data (such as the Statistics of Income), and national account estimates provided grounds for much of Tucker's (1951, 1952) criticism of the Musgrave study. The limitations of the available consumer budget studies, and an alternative proposal for dealing with them, were a second dimension of the criticism.

11.4.3 Assumptions and Results

Disagreements about appropriate statistical sources also reflected the lack of a consensus on the appropriate definition of income for tax burden measures. The Haig-Simons definition of income (consumption plus change in net worth) had not yet emerged as the standard definition in applied work, although the concept had long been accepted in theory. In practice, the considerable limitations of data on assets and imputed income (important for rural residents, homeowners, and for recipients of fringe benefits) made it difficult to implement this concept. An alternative income concept, proposed by Pechman (1951) and similar to that used by Musgrave et al. (1951), was the income

concept used for tax purposes. Taxable income corresponded more closely to a money income concept, and had the advantage of being readily available from Statistics of Income.

The state of tax incidence theory was no more settled than that of income theory. It had long been understood that assumptions about the ultimate incidence of corporate, sales, payroll, and excise taxes clearly affected conclusions about the distribution of tax burden. But the theory provided mixed guidance on which taxpayers actually bear the burden of the various taxes. At the same time, it was recognized that tax burden could not be measured independent of incidence assumptions (see, e.g., Colm and Tarasov 1941, 2). The incidence of taxes remained undetermined in theory in part because the tasks of specifying the full workings of a general equilibrium solution were then near the frontiers of economic theory (see, e.g., Oakes 1942). Reflecting the ambiguous state of theory, tax burden studies presented conclusions based on a series of alternative incidence assumptions (see, e.g., Newcomer 1937b; Colm and Tarasov 1941; Pettengill 1940; Adler 1951; and Pechman 1951). Typically, differences among studies were attributable as much to fundamental differences in income concept and data sources as to differences in incidence assumptions. (See, e.g., the analysis by Musgrave et al. 1951 of differences among their results and those of Colm and Tarasov 1941 and Adler 1951.)

Although the studies vary in their specific burden measures, they tend to agree on the general shape of the tax burden distribution before and after World War II. That structure is roughly U-shaped: regressive at the lowest income levels, approximately proportional over middle incomes, and progressive at higher income levels.

The results of aggregate data studies are generally summarized in two sets of comparisons. The first comparison is between the percentage of total income received by each income class and the percentage of total taxes paid by that class (e.g., Colm and Tarasov 1941, 28; and Musgrave et al. 1951, 26). This information sometimes is used, together with data on the distribution of households across income classes, to evaluate the equity of the tax system through Lorenz curves or Gini coefficients (as do Pettengill 1940; Adler 1951; Pechman 1951). When such comparisons are made across tax regimes, their interpretation can be complicated if the income distributions change in ways that cause the Lorenz curves to cross (see, e.g., Pechman 1951). The second comparison is of taxes paid as a percentage of income across income classes. This comparison reveals the progressivity of the tax system. Both comparisons are contained in table 11.6, which reproduces the summary table from Musgrave et al. (1951).

11.4.4 Policy Uses

Federal tax policy, as it responded to the array of problems facing the nation from the 1930s through the 1950s, was shaped in part by the tax burden stud-

Table 11.6 Distribution of Tax Payments by Income Groups: Summary[a]

Item	Spending Unit Income Brackets (thousands of dollars)							
	Under 1	1–2	2–3	3–4	4–5	5–7.5	7.5 and over	Total
Amounts (in $ million):								
1. Federal	620	2,243	5,392	6,682	5,079	6,754	17,010	43,794
2. State and local	433	1,123	2,131	2,512	1,755	2,061	3,542	13,552
3. All levels	1,052	3,366	7,523	9,194	6,834	8,815	20,552	57,344
Percent of yield total:								
4. Federal	1.4	5.1	12.3	15.3	11.6	15.4	38.8	100.0
5. State and local	3.2	8.3	15.7	18.5	12.9	15.2	26.1	100.0
6. All levels	1.8	5.9	13.1	16.0	11.9	15.4	35.8	100.0
Percent of income:								
7. Federal	16.5	16.2	18.6	19.0	19.3	21.1	30.1	22.3
8. State and local	11.6	8.1	7.3	7.1	6.7	6.4	6.3	6.9
a. State	5.8	3.9	3.7	3.7	3.5	3.4	3.4	3.6
b. Local	5.8	4.2	3.7	3.5	3.2	3.0	2.8	3.3
9. All Levels	28.1	24.3	25.9	26.1	26.0	27.6	36.3	29.2
Addenda:								
10. Income received	3,747	13,850	29,037	35,207	26,283	31,953	56,542	196,619
11. Percent of income[b]	1.9	7.0	14.8	17.9	13.4	16.3	28.8	100.0
12. Percent of spending units	12.2	17.7	22.9	20.1	11.6	10.2	5.3	100.0

Source: Reproduced from Musgrave et al. (1951), 26.
Note: Details may not add to totals because of rounding.
[a]Standard assumptions throughout.
[b]Includes income imputed under standard corporation assumption.

ies. Aggregate data studies (except for Tucker 1951) tended to similar conclusions despite reliance on a diversity of data sources, time periods, assumptions, and methodologies. All concluded that the federal tax structure was highly progressive, primarily because corporate and personal income taxes and death taxes that applied to the upper end of the income distribution offset regressive federal excise and payroll taxes. The total tax burden, including state and local taxes, was found to be less progressive, with taxpayers in the lowest income brackets sometimes found to bear a higher ratio of taxes to income than middle-income taxpayers (see Adler 1951; Pettengill 1940; as well as Musgrave 1952, 1953; Colm and Wald 1952; and Pechman 1951 above). Increasing the progressivity of the tax structure, either by raising statutory income tax rates for upper-income brackets or raising their effective tax rates through base broadening, was a consistent goal of federal tax policy. The choice among alternative revenue sources to balance budget deficits, hold down inflation, and pay for wars was made not only on the basis of their relative yield and administrative feasibility, but also on the basis of their relative effects on equity.

World War II financing took account of the conclusions of early tax burden studies that the federal income tax was the most progressive of the federal government's tax instruments. Congress raised rates and lowered exemptions to the federal income tax, turning the income tax into a broad-based tax. In the early 1950s, policy recommendations in the Economic Report of the President (1951) addressed the growing tax burden and problems in measuring it when prices and incomes were growing rapidly. The Joint Committee on the Economic Report shared those concerns. It proposed quelling inflationary tendencies induced by financing the Korean War by selectively raising the excise taxes that would most affect middle- and upper-income taxpayers: "If tax burdens are so great as to shock the sense of justice or equality, some way is found to avoid them or to pass them on into higher prices," and therefore, specific tax proposals "should take cognizance of the fact that the people in the lower-income brackets . . . are already overburdened . . . by the increasing cost of living and the present level of taxes," and new taxes should be targeted "to absorb surplus purchasing power where it exists" (U.S. Congress, JCER 1951, 7–8).

11.4.5 Problems

The data available through the 1950s and the aggregate data approach did not allow measures of horizontal equity within income classes to be calculated. Horizontal equity was an issue because of the postwar growth in sources of untaxed income that would tend to increase the variability of tax burdens within an income class. Pechman (1958) noted this problem in a discussion of Goldsmith's conclusion that pre- and postwar income distributions were similar. The 1959 Tax Revision Compendium, a summary of congressional hearings (U.S. Congress, House Committee on Ways and Means 1959), also raised the question of horizontal equity. Despite the growing concern, however, there were few alternatives available for empirical work. Data on the taxes, income, and consumption of individuals and families, together with ways to link these data would have been required to construct the necessary tax burden measures. The income measure would need to be independent of the current tax law, as well. The unit of interest for equity comparisons, usually the household or family unit, was rarely the unit for which data was available. In particular, income tax data were presented on the basis of filing units, generally different from the family or household survey units underlying expenditure data and other income surveys.

Additional questions about the internal consistency of assumptions on the incidence and timing of taxes were raised by Prest (1955). Many of the inconsistencies reflected difficulties inherent in applying a theoretical framework that is essentially a long-run general equilibrium framework to the analysis of a single period.

11.5 Microdata Studies

11.5.1 Summary

Microdata studies represent one of the two major directions of current tax burden research. Microdata studies improve upon aggregate data models in their greater capability to model variations in tax burden across individuals within an income class (i.e., to address horizontal equity), their relative independence from the tax base defined in current law, and their ability to describe results by demographic and nontax economic characteristics of policy interest. The first tax microdata model, developed at Treasury in the early 1960s, was used to assess tax burden in constructing President Kennedy's 1963 reform proposals. Microdata models are widely used in current policy analysis by the Office of Tax Analysis (OTA) of the Treasury Department and the Joint Committee on Taxation, among others. The OTA simulation model and its relationship to new data developments and limitations are discussed in section 11.7 below.

11.5.2 Data and Technology

The need for data on individual economic units in order to measure the equity of tax burden among individuals with similar incomes but differential access to exclusions and differential patterns of consumption, income, and savings had been noted as early as 1951 (Pechman), but neither the data nor the means to analyze them became available until the early 1960s.

Data

The heavy data demands that tax burden studies make were partially met by the growing availability of tax and survey microdata. Serious gaps, however, persisted. A 1964 study conducted for the Subcommittee on Economic Statistics by T. Paul Schultz examined the statistics available on the size distribution of personal income in the United States and presented a series of recommended changes (U.S. Congress, JEC 1965a). A number of those recommendations were directly relevant for measuring the income component of tax burden. Several of those proposals addressed the lack of data on wealth and nonlabor income, a serious omission for any attempt to construct a comprehensive income measure. The upcoming 1970 census could be modified to collect net wealth data and also more finely detailed categories of personal income than before. The annual Survey of Consumer Finances also was an obvious potential vehicle for collecting data on net worth of consumer units, particularly in light of the panel character of the data collection in 1961–63. Finally, demographic and financial data could be collected from an expansion of the individual income tax form.

Subsequent hearings and collections of views by statistical agencies and users of federal statistics resulted in similar recommendations for more de-

tailed and timely data (U.S. Congress, JEC 1965a, 1965b, 1966, 1967, 1969). Schultz's recommendation for using new computer technology to link data collected by various statistical agencies was repeated in the later hearings and emerged as a proposal for a central statistical service center. When the problem of maintaining personal privacy under such a center was raised, proponents were confident that stringent safeguards could enhance rather than reduce the confidentiality of government statistical records (U.S. Congress, JEC 1967). In an increasingly computerized era, however, public concern about privacy was growing as evidenced in the 1969 hearings before the Subcommittee on Economic Statistics. The perception that an Orwellian Big Brother was possible created a firestorm about the upcoming 1970 census, particularly when coupled with debates over proposals by the statistical agencies that citizens should be compelled, under threat of jail or fine, to respond. In the face of public opposition, the proposal for a central statistical service center fell by the wayside. Neither of the two remaining proposals bore fruit in their original form. Rather than being expanded, the Survey of Consumer Finances was soon discontinued. Concerns about respondent burden and privacy limited expansions of the federal income tax forms.

A new wave of detailed surveys on income, wealth, poverty, and movements among income classes was begun in the 1960s to address these data needs. Public-use versions of the Statistics of Income individual return data were available from the early 1960's. The 1967 Survey of Economic Opportunity collected information on assets and nonwage income from 30,000 households. Public-use microdata tapes for the monthly CPS were first made available for March 1968. The CPS collected demographic and income information on individuals and also on their households. Longitudinal surveys, such as the Panel Survey of Income Dynamics (PSID) and the series of National Longitudinal Surveys (NLS) of age cohorts of men and women, were begun.

Despite these new surveys, none collected income, consumption, and wealth in a single, nationally representative, large-scale statistical source. To the contrary, data availability in general worsened until recently. The 1963–64 Survey of the Financial Characteristics of Consumers remained the most recent source of wealth data on an individual basis until the Federal Reserve Board repeated the survey in 1983 and (on a limited basis) 1986. The current sample size is an order of magnitude below that of the CPS. The Survey of Income and Program Participation (SIPP) meets the need Schultz articulated in 1964 for detailed demographic and economic data over time in a broad-based national survey, and includes one-year-apart surveys of wealth in its longitudinal framework for 1983–84 (see McNeil and Lamas 1989). Needs for detailed data on the receipt and cost of fringe benefits by individual taxpayers, stated by Pechman (1951) and repeated periodically (see U.S. Congress, JEC 1965b; Triplett 1983) remained largely unmet. For example, although the May 1979 CPS collected data on the receipt of employer-provided

retirement and health benefits and repeated similar questions in May 1983 and May 1988, it did not collect either the amount of employer contributions for these benefits or the incidence of other benefits. Consumption and expenditure data were provided at intervals of a decade (by the Survey of Consumer Expenditures conducted for the BLS in 1960–61 and 1971–73) until the current series of ongoing Consumer Expenditures Surveys began in 1980. Reliance on some method of record linking or of imputing data missing on the basic data source remains an essential component of current tax burden methodology.

Computing Technology

Developing a sample of tax returns that would permit detail and accuracy as well as speed and flexibility in modeling the burdens of alternative tax provisions required computer technology. The Internal Revenue Service had joined with the Census Bureau in 1955 to purchase a computer. The Statistics of Income samples were then put on computer tapes, but the format could not be readily adapted to different analytical uses outside specific Statistics of Income applications. Researchers, IRS advisory groups, and tax policymakers recommended creating a microdata file for tax policy research. The first microdata computer tape of a sample of individual tax returns for use in examining tax burdens was not produced until February 1962. The data were a 100,000-record subsample of the 429,000 tax returns used to produce the 1960 Statistics of Income tabulations. The subsample was produced and stored on computer tape at the request of the Office of Tax Analysis (OTA) of the U.S. Treasury. The computer technology available, while it made the project feasible at all, was costly and cumbersome. The data file required 50 reels of tape, the model required four to six weeks of programming time for each set of complex changes in tax provisions, and simulations consumed as much as eight hours of computer time, with total cost of a model run exceeding $1,000 (in 1962 dollars).

Computing cost was not the sole resource constraint. Techniques that made statistical matches among records from multiple surveys in attempts to fill gaps in the individual surveys typically required even greater programming and computing capabilities than analyses of single microdata files. Because of the resources required, microdata models tended either to rely on a sole data source (as did the OTA model) or to be long-term research products describing a period a year or more in the past. Research commissioned by the OTA in the mid-1970s dramatically reduced the computer time needed to produce a matched file that had desirable statistical properties. The standard optimal technique required five weeks for one of the six steps in the match; the new technique (Barr and Turner 1978) required six hours. Documenting all the matching, weighting, imputing, extrapolating, and tax calculating programs that produced the final tax model data base demanded commitment of scarce staff resources.

Continuing declines in quality-adjusted computing costs make the comput-

ing services that microsimulation require increasingly affordable. The microsimulation model has become an integral part of tax policy formation for both the OTA and the Joint Committee on Taxation, and remains a major evaluation tool for policy analysts outside the federal government.

Statistical Innovations

An important innovation for tax burden research was instituting efficient sampling techniques in the Statistics of Income program. When the wartime conversion of the income tax to a broad-based tax dramatically increased the number of tax returns, Statistics of Income's prewar practice of tabulating a relatively high proportion of returns (e.g., one out of four returns in 1926) quickly became cumbersome (Natrella 1966). Improved sampling produced a manageable number of returns for analysis, and the sample size continued to drop as sampling technique became increasingly sophisticated.

11.5.3 Studies Based on Microdata

Studies Based on One Microdata Source

Annual public-use versions of the Statistics of Income sample were made available to other researchers beginning with the 1962 sample (Natrella 1966). Pechman's 1965 study of the change in tax burdens under the Revenue Act of 1964, the earliest published study using microdata, was based on a sample of 100,000 federal tax returns. With access to the details of individual records, tax liability could be calculated from the individual records rather than from income class averages. Variations in definitions of income could also be explored.

The tax return sample increased modeling capabilities, but room for improvement remained. Returns were available only for individuals required to file tax returns under the current tax law, but information on those not required to file was needed to model the effects of tax proposals that made major modifications to the Internal Revenue Code. Modeling capabilities also were constrained by the limited information recorded on tax returns. Demographic data were not recorded on tax returns, although policy questions often asked about the equality of tax burdens across demographic groups. There was no way to join tax returns of related individuals to form real families, although the unit of policy interest was generally the family rather than the individual. Treasury testimony (in U.S. Congress, Senate, Committee on Finance 1962) and Pechman (1965) reflect these limitations. Treasury's adjusted gross income measure and Pechman's taxable income measure both depended on income items reported on the tax return, rather than on a broader Haig-Simons income measure.

A series of microdata models of tax burden followed these seminal studies in the 1960s and early 1970s. The new studies drew on technical innovations and new microdata sources. Bossons developed "A General Income Tax Analyzer" in 1966 for Canada, using 1964 tax return data (Bossons 1967). The

introduction acknowledges the integral role of the computer in the development and practical use of that model. The raw data, 412,000 tax returns, initially were stored on 16 reels of tape before similar returns were aggregated into a more tractable 19,000 groups. Bossons's study describes its methodology and data sources clearly and provides the 200 pages of computer code required to convert the raw data into final printed tables. This documentation appears to be the first public offering of such material to other potential analysts. The pragmatic effect of the model on Canadian tax policy was to make it feasible to examine the effect of a series of alternative rate schedules and thereby to "obtain a significantly lower rate schedule that would raise sufficient revenue and which would come closer to meeting the commission's objectives" than the original, hand-calculated rate schedule (Bossons 1967, 2). Estimates of tax burden by income, age, occupation, and sex were calculated for alternative tax schedules.

Researchers interested in measuring U.S. tax burden applied similar methodologies to new data sources. A new National Survey of Consumer Expenditures and Income for 1960–61, conducted by the BLS, was the basic data source in an aggregate data study by Bishop (1967) comparing tax burdens in 1961 and 1965. Herriot and Miller (1971a, 1971b) relied on tabulations from the 1968 CPS as the basic data source in their aggregate study, supplemented by distributions of consumption, wealth, and taxes from the 1960–61 BLS Expenditure Survey, the 1960 Survey of Consumer Finances and the 1963 Survey of Financial Characteristics of Consumers, and the Statistics of Income.

A series of studies exploited the underlying microdata of new surveys. Browning and Johnson (1979) conducted a tax burden study using the 47,000-household CPS microdata from March 1975. Longitudinal data from the PSID for 1967–77 (including income and asset data, federal tax payments, and family and other demographic data) were used by Ott and Dittrich (1981) to examine changes in tax burden under the Revenue Acts of 1969 through 1978. Berliant and Strauss (1983, 1985) make use of an 11-year series of public-use Statistics of Income tax data files, with several hundred thousand observations in each year's file (about twice the size of the OTA's tax file). The computational resources required by the size of the data sets and the complexity of their burden calculations were large enough both for comment and discussion of methods for reducing the size of the computations. The NBER also maintains a microdata model based on Statistics of Income data (Feldstein 1987).

Tax burden models based on a single underlying microdata source share several limitations. Models based on tax records have little information on income from nontaxable sources and no information at all on those not required to file under current law. The taxpaying unit generally is not the family or spending unit whose relative welfare is being evaluated under alternative tax structures; demographic and other information needed to form family

units are not collected on tax returns. The models based on nontax survey data are better able to combine data to form appropriate family units and to analyze the tax burden of alternative demographic groups, but typically have less precise information about the taxes actually paid by the surveyed units. Similar problems during the 1960's were encountered by researchers interested in developing size distributions of income to measure poverty and analyze its causes (Budd and Radner 1969).

Studies Based on Multiple Microdata Sources

Exact and statistical linkage of several microdata files were proposed as a method of providing the information missing from any single survey. The movement toward matching of data sets was partially motivated by the decreasing cost and increasing speed at which such tasks could be accomplished. Prices for second-generation computers had been declining since 1962, and the introduction of third-generation machines in the mid-1960s lowered the prices of older machines as well as providing new technology whose own quality-adjusted price also continued to decline over time (Triplett 1989). Exact-match experiments conducted in the 1970s produced, for example, the 1973 three-way exact match of the IRS, CPS, and Social Security Administration records. Confidentiality problems, however, made the resulting data difficult for most researchers to use whether outside government or within. Statistical linkage of tax return records from the Statistics of Income and the CPS was first accomplished not for calculating tax burden but for measuring poverty (Budd and Radner 1969), although the applicability of the technique to improved tax research was clearly stated. The importance of advances in computer technology to statistical linkages was also explicitly noted.

The first tax burden study to use statistically linked microdata was Pechman and Okner (1974), based on the 1967 Survey of Economic Opportunity and the 1966 Statistics of Income public-use sample. The Survey of Economic Opportunity had observations on about 30,000 households, and the Statistics of Income sample contained about 87,000 returns. Updated versions of the original Survey of Economic Opportunity–Statistics of Income data, with the CPS replacing the Survey of Economic Opportunity, continued to be used to analyze the distribution of tax burdens (Pechman 1985 and 1986). The OTA constructed statistically matched data for its tax model in 1976 and used that model in preparing tax reform proposals in 1977. Statistically linked microdata from the CPS and the Statistics of Income became its standard tax model data base.

11.5.4 Assumptions and Results

Tax burden measures based on microdata models generally show the overall tax structure from the 1960s through 1980s to be roughly proportional, despite differences among the models in data sources, theories of tax incidence,

and estimation methodologies. The proportional tax structure contrasts with early representative taxpayer and aggregate data studies that showed a U-shaped structure.

An important advantage of microdata models over aggregate data models is that tax burden estimates can be calculated to assess horizontal equity. Such calculations, made by Ott and Ott (Commission to Revise the Tax Structure 1973), Pechman and Okner (1974), and Pechman (1985), show substantial variations in burden among households with similar incomes. Tables 11.7 and 11.8 reproduce tables from Pechman and Okner that use microdata to assess the degree of horizontal equity in the tax system. Means, standard deviations, medians, and quantile variations in effective tax rates are calculated for two alternative sets of incidence assumptions. The calculations are made separately for each population income decile. The degree of variability of effective tax rates varies by income class under both sets of incidence assumptions. Effective tax rates for demographic and economic subgroups, such as the aged and nonaged and homeowners and renters, are calculated in table 11.8 for a detailed series of taxes under the same two sets of incidence assumptions. Table 11.9 reproduces a table from the Commission to Revise the Tax Structure (1973) showing horizontal equity by income class based on frequency distributions of effective tax rates by income class.

Table 11.7 **Mean and Median Effective Federal, State, and Local Tax Rates and Measures of Variability of Tax Rates under Incidence Variants 1c and 3b, by Population Decile, 1966 (in percentages)**

	Variant 1c				Variant 3b			
Population Decile	Mean	Standard Deviation[a]	Median	Quartile Deviation[a]	Mean	Standard Deviation[a]	Median	Quartile Deviation[a]
First[b]	16.8	30.1	15.3	6.1	27.6	35.9	23.0	6.6
Second	18.6	14.6	17.8	5.3	24.8	16.3	23.6	4.9
Third	21.6	19.6	21.3	4.1	26.0	12.6	25.0	4.2
Fourth	22.6	8.8	22.1	3.8	25.9	10.5	25.2	3.7
Fifth	22.8	6.5	22.6	3.2	25.8	7.3	25.4	3.2
Sixth	22.7	5.5	22.6	2.8	25.6	5.8	25.6	2.6
Seventh	22.7	6.6	22.4	2.7	25.5	5.5	25.3	2.4
Eighth	23.1	5.9	22.7	2.5	25.5	5.2	25.4	2.2
Ninth	23.2	5.4	22.9	2.4	25.1	4.9	25.1	2.2
Tenth	26.2	10.2	24.5	3.9	25.0	8.6	24.6	2.5

Source: Computed from the 1966 MERGE data file. For an explanation of the incidence variants, see Table 3-1. Reproduced from Pechman and Olkner (1974), 67.

Note: Variant 1c is the most progressive and 3b the least progressive set of incidence assumptions used in this study.

[a]See text for the definition of the standard deviation and the quartile deviation.

[b]Includes only units in the sixth to tenth percentiles.

Table 11.8 **Effective Federal, State, and Local Tax Rates for Various Demographic and Economic Groups under Incidence Variants 1c and 3b, 1966 (in %)**

Group and Variant	Individual Income Tax	Corporation Income Tax	Property Tax	Sales and Excise Taxes	Payroll Taxes	Personal Property and Motor Vehicle Taxes	Total Taxes
Nonaged:							
Variant 1c	8.7	3.2	2.5	5.2	4.9	.3	24.8
Variant 3b	8.6	4.1	3.2	5.1	4.6	.3	25.9
Aged:							
Variant 1c	6.9	8.2	5.9	4.5	1.9	.2	27.6
Variant 3b	7.2	6.6	4.4	4.7	2.8	.2	25.9
Homeowners:							
Variant 1c	8.4	4.4	3.4	4.7	4.0	.3	25.2
Variant 3b	8.3	4.6	3.6	4.7	4.0	.3	25.6
Renters:							
Variant 1c	8.7	2.7	1.9	6.1	5.6	.2	25.3
Variant 3b	8.5	4.0	2.8	6.0	5.3	.2	26.9
Urban:							
Variant 1c	9.0	3.8	2.7	5.0	4.6	.3	25.4
Variant 3b	9.0	4.2	3.1	5.0	4.5	.3	26.0
Rural-Farm:							
Variant 1c	6.0	4.6	4.3	5.4	3.7	.3	24.3
Variant 3b	6.0	5.5	4.6	5.3	3.8	.3	25.5
Single persons:							
Variant 1c	11.1	6.5	3.7	5.7	4.3	.2	31.6
Variant 3b	11.5	5.0	3.0	5.9	4.6	.2	30.2
Married couples, no children:							
Variant 1c	9.0	5.9	4.3	4.7	3.7	.3	27.9
Variant 3b	9.2	5.2	3.6	4.8	3.8	.3	26.8
Married couples, two children:							
Variant 1c	8.7	2.7	2.2	5.0	4.8	.3	23.8
Variant 3b	8.5	3.8	3.1	4.9	4.6	.3	25.2

Source: Computed from the 1966 MERGE data file. For an explanation of the incidence variants, see table 3-1. Reproduced from Pechman and Okner (1974), 72.
Note: Variant 1c is the most progressive and 3b the least progressive set of incidence assumptions used in this study.

11.5.5 Policy Uses

Tax burden studies based on microdata models have generally concluded that the prevailing tax structure was roughly proportional to income for most of the population, with the Federal income tax the major progressive component. (Browning and Johnson [1979], who found the present system highly progressive, are exceptions.) Proportionality of taxes and progressivity of the

Table 11.9 **Frequency Distribution of Effective Tax Rates for Selected Income Classes under Alternative B and Present Law, 1971 (households in thousands)**

	3,000–4,999		5,000–6,999		10,000–11,999		50,000–99,999	
Rates	Present Law	Alternative B	Present Law	Alternative B	Present Law	Alternative B	Present Law	Alternative B
0–1	3183.55	2284.00	1750.92	60.10	120.89	14.17	2.53	.00
1–2	643.89	4359.29	661.78	643.49	54.85	1.14	.58	1.15
2–3	667.76	902.44	640.64	3811.53	196.81	53.33	1.38	.00
3–4	837.12	.00	712.51	3269.93	227.73	137.44	.12	.00
4–5	580.57	.00	694.13	248.60	437.12	245.24	.23	.00
5–6	621.13	.00	534.22	.00	703.06	2126.21	.23	2.30
6–7	688.97	.00	612.63	.00	722.58	3902.95	.35	.00
7–8	254.89	.00	579.72	.00	1008.46	1238.60	4.94	.00
8–9	49.94	.00	866.65	.00	839.72	18.03	8.14	4.59
9–10	18.03	.00	632.58	.00	1101.17	.00	6.32	.00
10–12	.00	.00	285.71	.00	889.72	.00	2.89	.00
12–14	.00	.00	57.77	.00	785.73	.00	28.49	5.98
14–16	.00	.00	.00	.00	472.01	.00	35.76	10.45
16–18	.00	.00	4.59	.00	4.59	.00	80.15	18.26
18–20	.00	.00	.00	.00	42.11	.00	78.16	19.20
20–22	.00	.00	.00	.00	117.59	.00	79.28	39.09
22–24	.00	.00	.00	.00	13.15	.00	79.80	61.98
24–26	.00	.00	.00	.00	.00	.00	85.65	145.45
26–28	.00	.00	.00	.00	.00	.00	64.40	134.71
28–30	.00	.00	.00	.00	.00	.00	44.81	111.90
30–34	.00	.00	.00	.00	.00	.00	32.21	77.83
34–38	.00	.00	.00	.00	.00	.00	41.72	59.94
38–42	.00	.00	.00	.00	.00	.00	12.37	.00
42–46	.00	.00	.00	.00	.00	.00	2.08	.00
46–50	.00	.00	.00	.00	.00	.00	.23	.00
50–54	.00	.00	.00	.00	.00	.00	.00	.00
54–58	.00	.00	.00	.00	.00	.00	.00	.00
58–62	.00	.00	.00	.00	.00	.00	.00	.00
62–66	.00	.00	.00	.00	.00	.00	.00	.00
66–70	.00	.00	.00	.00	.00	.00	.00	.00
Total Households	7,545.85	7,545.73	8,033.85	8,033.65	7,737.29	7,737.11	692.82	692.83

Source: Reproduced from Commission to Revise the Tax Structure (1973), 182–83.
Note: Total households in each class differ slightly due to rounding.

federal income tax remain relatively stable conclusions across studies and across alternative incidence assumptions within a study. Horizontal inequities are found within income classes, attributable to specific features of the Internal Revenue Code (additional exemptions or exclusions, for example) and to variations in income sources and consumption patterns.

The policy implications that follow from these conclusions are to broaden the tax base, lower tax rates (especially at lower incomes), and eliminate ex-

cise taxes, thereby increasing horizontal equity while achieving the desired vertical distribution of the tax burden. These conclusions are common to most of the microdata studies (Browning and Johnson 1979 again are an exception) as well as common to prior studies based on aggregate data (see the 1959 Tax Revision Compendium [U.S. Congress House Committee on Ways and Means 1959]; e.g., as well as Musgrave et al. 1951). Not surprisingly, the major tax reform proposals of the last decade have reflected these conclusions.

The first Treasury tax model was immediately put to use in preparing President Kennedy's 1963 Tax Message. That Message proposed, in "the most urgent task confronting the Congress in 1963," to reform the federal tax system to provide stimulus to the economy and to minimize "inequities and complexities that affect similarly suited taxpayers in wholly different ways," while making the largest proportionate reduction "to those at the bottom of the economic ladder" (U.S. Congress, House 1963, 154–55). Table 3 of that Message compares distributions of tax burden among income classes under then-current law and under the proposed law. Since 1963, tables produced from the OTA and the Joint Committee on Taxation microsimulation models have been used extensively in the consideration of all major tax bills.

11.5.6 Problems

Despite their advances over aggregate data models, microdata models still are limited with respect to data, economic theory, statistical theory and practice, and computer technology. The limitations reduce the models' abilities to address policy questions in ways that inform the debate rather than diverting the debate to the merits of the estimates they generate.

Theoretical problems, unresolved with respect to aggregate data models, persist in microdata models. Even in the definition of income, where consensus in principle on the Haig-Simons definition of income has a long history (see Musgrave 1985), differences in interpretation arise in practice. Thus, both Pechman and Okner (1974) and Browning and Johnson (1979) adopt Haig-Simons income definitions, but differ on, among other things, which transfer income items are included. The studies differ also in their assumptions on the shifting of taxes, an area where there is somewhat less consensus in the literature. The absence of a consensus on incidence complicates evaluations of the models. Whalley (1984) presents a series of calculations showing the sensitivity of tax burden measures to alternative incidence assumptions and income measures similar to Pechman and Okner (1974), on the one hand, and to those of Browning and Johnson (1979), on the other. A comparison of pairs of tax burden measures shows that the choice of shifting assumptions alone can determine whether the tax structure appears to be progressive or regressive. Similarly, the choice of income concept alone can determine progressivity or regressivity. Other assumptions, such as the choice of time period (single periods or lifetimes) over which tax burden ought to be measured,

and the economic unit (e.g., families, households, or tax returns) also directly affects the conclusions.

The statistical matching of two microdata sets raises a host of unresolved statistical questions about the properties of the resulting matched data set. See, for example, the discussion about the Survey of Economic Opportunity and the CPS linkage underlying Pechman and Okner (1974) (Okner 1972a, 1972b; Sims 1972; Peck 1972; Budd 1972), and a parallel discussion of linkages between other microdata sets (Okner 1974; Sims 1974). Treasury sponsored further research on statistical problems with merged data files (Kadane 1978) and also sponsored new research on alternative linking techniques with better statistical properties (Barr and Turner 1978). Policy needs unmet by existing data sets outweighed criticism of matched data sets, however, and microsimulation models linking data from multiple sources rapidly became standard in tax policy and other policy settings (Barr and Turner 1978). Research has continued to improve the statistical properties of such data sets with missing data (see, e.g., Kalton 1983; Rodgers 1984; David et al. 1986; Rubin 1987; and Little and Rubin 1987).

Beyond the problems of statistical matching, microdata models encounter additional statistical problems. The subgroup of interest for a specific policy problem frequently is a subgroup for which the underlying sample is too small to make accurate estimates. For example, policies are frequently evaluated for their effect on the poor or the elderly, or on the recipients of one kind of income versus another, while the original sample was not designed to represent those subgroups. Another problem is that analyses are typically wanted for the current period or for a federal budget period, while data become available only with a lag (e.g., 1986 tax return data will become available in 1988). The data must be extrapolated to current and future dollar levels through implicit or explicit modeling of growth and change.

11.6 Applied General Equilibrium Studies

11.6.1 Summary

Applied general equilibrium models developed over the last 15 years into the second major tool for analyzing tax policy and its effects on the distribution of tax burden. Practical implementation of these models was spurred by formal proofs of the existence of competitive equilibrium under quite general conditions and the development of efficient computing algorithms, together with computer speed and capacity to make their solutions practical as well as possible. Applied general equilibrium models quickly added features of the tax system and grew increasingly disaggregated. The appeal of these models for analyzing tax policy is the appeal of general, rather than partial, equilibrium analysis itself. The general equilibrium approach provides a formal framework for examining the interaction among various taxes and transfer

programs and their joint effect on economywide allocation, distribution, and growth questions. Tax burden analysis and the tax incidence literature both are generally couched in general equilibrium terms. Much of the empirical analysis used in the policy debate was nevertheless set in partial equilibrium terms (see, e.g., Musgrave et al. 1951; Pechman 1985; Cilke and Wyscarver 1987; U.S. Congress, Congressional Budget Office 1987).

The first relatively large-scale applied general equilibrium models were developed in the early 1970s (Shoven and Whalley 1972; Shoven 1976). The evolution of applied general equilibrium models is recounted elsewhere (Fullerton, Shoven, and Whalley 1978; Shoven and Whalley 1983; Piggott 1985). A disaggregated general equilibrium model of the United States was developed by Fullerton, Shoven and Whalley (1978) with support provided in part by the OTA. These models have been applied to a series of tax policy problems ranging from general distortions induced by taxation (Shoven and Whalley 1972; Fullerton and Gordon 1983) to the analysis of specific reform proposals such as switching to a consumption tax (Fullerton, Shoven, and Whalley 1983). A subgroup of general equilibrium models has been used to examine the dynamic properties of alternative tax policies such as the duration of the adjustment process and the distributions of tax burdens at intermediate stages during the process (Feldstein 1978; Auerbach and Kotlikoff 1983; Auerbach, Kotlikoff, and Skinner 1983). The general equilibrium models themselves have incorporated some dynamic elements (Ballard et al. 1985).

11.6.2 Data

The data demands of the general equilibrium models range more broadly, but require less detail than, those of microdata models. Income, consumption, and tax data for individuals are required, but generally are aggregated to income classes. Additional data not required by the aggregate and microdata models include an input-output matrix for producers and a transition matrix linking producer goods to consumer goods, as well as data on investment, government purchases, and foreign trade. The data are assembled for a single year or an average of years. Applied general equilibrium models share data reconciliation problems common to other approaches to measuring tax burden, including resolving differences among alternative sources of similar data and differences between theoretical concepts and actual measures.

The data gaps that limit microdata models also limit applied general equilibrium models. In particular, the lack of wealth data and of the income from it make it difficult to construct models of intertemporal choices between consumption and savings that accurately reflect particular time periods.

11.6.3 Assumptions and Conclusions

The existence of computable applied general equilibrium models coincided with a new wave of literature on theoretical tax incidence (Shoven 1976; Rosen 1978; Ballentine and Eris 1975; Vandendorpe and Friedlaender 1975;

Feldstein 1977; McLure and Thirsk 1975a, 1975b; McLure 1975). The applied framework provided an opportunity to quantify the tax burden resulting from existing incidence theories and also provided the means to calculate the consequences of alternative theories.

A long-run perspective on the process of adjusting to changes in tax laws can be constructed from sequences of equilibria that add current savings to the capital stock and income of future periods. This sequence also can be used to generate a sense of the length of the adjustment process to the final equilibrium and to calculate the incidence and size of the tax burden on various groups during the process. A parallel literature has developed on the dynamic properties of alternative reforms, such as switching from a consumption to an income tax, and vice versa (Eaton and Rosen 1980; Bernheim 1981; Summers 1981; Auerbach and Kotlikoff 1983; Auerbach, Kotlikoff, and Skinner 1983).

11.6.4 Policy Uses

Applied general equilibrium models make several significant contributions to tax burden measurement and tax policy formation. The structure of the models provides a formal mechanism for applying alternative tax incidence assumptions about the full range of taxes and for analyzing the effect of taxes on real income, economic efficiency, and growth. Applied general equilibrium models permit changes in tax revenues under alternative tax structures to be separated from the distortions in economic efficiency caused by taxation. Measures of excess burden under alternative tax structures and measurement concepts can be calculated and compared (Auerbach and Rosen 1980; Auerbach 1985; Diewert 1985).

Conclusions on the distribution of tax burden based on applied general equilibrium models have influenced tax policy in a more indirect way than have conclusions based on microdata models. General equilibrium results currently make their mark on policy by influencing economists' views, but generally are not a standard tool for analysis either in Congress or at the Treasury. The models have several problems that make them less suitable for day-to-day policy analysis than microdata models.

11.6.5 Problems

Computational requirements for the models, although dropping at the same time computing costs are falling, remain large enough that researchers still search for ways to reduce them (Ballard et al. 1985). Because consumption time is partially a function of the dimensionality of the model, the need to minimize time counterbalances the desire for more disaggregated models. The current version of the Ballard et al. model, for example, has 12 consumer categories, 15 consumer goods, and 19 producer goods, plus taxes, government, and exports. This is much more detailed than the two-by-two models of Harberger and Diamond, but remains below the level of disaggregation available in microdata models. Despite efforts to increase computational efficiency,

general equilibrium models remain too cumbersome to be practical in policy analysis. Further, they lack the flexibility of microdata models in terms of examining the tax burden of specific population subgroups as need arises. Moreover, like representative taxpayer and aggregate data measures, they ignore variability in income, consumption, and taxation within subgroups.

The models also depend on strong assumptions about the specific forms of utility and production functions. The forms are chosen as much for their tractability as for their theoretical properties, with Cobb-Douglas, constant elasticity of substitution, and fixed coefficients forms common. (An alternative approach is based on econometric estimations of flexible functional forms for utility and production functions; see Jorgensen 1984.) Elasticities are chosen from the empirical literatures, which are themselves often in disagreement about appropriate theory, estimation methodology, and data (see, e.g., discussions of "the" elasticity of labor supply in Borjas and Heckman 1979; Hausman 1981; and Killingsworth 1983). Incidence theory plays as important a role in the conclusions reached in general equilibrium models as in microdata models, and is no more resolved. A final concern about applied general equilibrium models is that test statistics to assess their reliability have not been developed and sensitivity analyses of the effect of alternative assumptions remain relatively uncommon (Whalley 1984).

11.7 OTA Microsimulation Studies

The Office of Tax Analysis in the Department of the Treasury maintains a microsimulation model that it uses to estimate and evaluate distributional, revenue, and economic impacts of individual income taxes. A similar model is maintained by the staff of the Congressional Joint Committee on Taxation. During the recent tax reform process, the model was used to examine the effects of thousands of proposed changes to the Internal Revenue Code. The issues examined ranged from the effect of changes in a single provision to the interaction among sets of provisions and also included analyses of the distributional effects of proposed changes. Additional features of the model and its data base allowed these issues to be analyzed on a family as well as a tax return basis, provided distributional consequences based on several alternative income measures, and estimated the impact on the number of tax filers. Finally, the data base contained income and population measures independent of the current law, allowing comparisons of alternative proposals against a common measure and also allowing the modeling of provisions that applied to components of income not taxable (and therefore not reported on tax forms) under the prereform law. The simulation model, the data base developed and used during the tax reform process, and the construction of a Haig-Simons definition of income are described in detail in Cilke and Wyscarver (1987), Nunns (1987), and Nelson (1987). The model itself is documented in Wyscarver (1985).

The series of tax burden measures considered during the tax reform process included estimates of the proportion of families with tax increases and tax decreases, of percentage tax reductions for families by income category and itemizing status, as well as percentage tax reductions by income class (U.S. Treasury, Division of Tax Research 1985a, 1985b; U.S. Congress, JCT 1986). Additional tax burden considerations were shown in comparisons of the number of tax returns in each income class that would show selected income sources, adjustments, and deductions under then-current law and under reform proposals. The distribution of tax liability under prior law and under the Tax Reform Act of 1986 for these tax burden measures are given in tables 11.10–11.13 below.

The choice of income measure clearly affects both the estimated distribution of taxes by income class and the effect of reform proposals. Table 11.10 presents distributions based on three alternative income measures. Adjusted gross income (AGI), a somewhat expanded income measure (labeled MEI, for modified expanded income), and family economic income (FEI, a measure closer to the Haig-Simons concept than AGI or MEI) are considered in turn. The associated tax unit concepts also vary among the measures. AGI and MEI are calculated on a return basis, while FEI is calculated on a family basis. AGI is the measure readily available from tax returns, while MEI is a measure developed and used by the Joint Committee on Taxation and FEI is used by OTA.

Tables 11.11–11.13 demonstrate the variety of analytical tabulations the tax model makes possible. The distribution of family economic income and of

Table 11.10 **Individual Tax Liabilities under 1988 Law, Before and After the Tax Reform Act of 1986, by Economic Income of Families, Modified Expanded Income of Returns Age 16 and over, and AGI of Returns (1983 levels of income)**

Income Class ($1,000s)	AGI of Returns			MEI of Returns Age 16+			Economic Income of Families		
	Prior Law	TRA Law	% Change	Prior Law (%)	TRA Law (%)	% Change	Prior Law	TRA Law	% Change
0–10	1.9	1.7	−15.6	1.2	1.0	−17.7	.5	.4	−24.3
10–15	4.8	4.3	−14.6	3.6	2.8	−25.8	1.7	1.2	−34.1
15–20	6.5	6.4	−6.5	5.3	4.9	−13.0	3.2	2.7	−18.9
20–30	16.5	16.4	−4.9	14.1	13.8	−6.7	10.5	10.2	−7.1
30–50	29.5	29.8	−3.5	28.9	28.6	−5.9	26.3	26.3	−4.8
50–100	19.2	20.2	.2	22.5	23.7	.0	31.0	32.3	−.8
100–200	8.6	8.7	−3.7	8.9	9.3	−.1	10.6	11.2	.1
200+	12.9	11.9	−12.3	15.4	15.9	−1.8	16.1	15.5	−8.5
Total	100.0	100.0	−4.7	100.0	100.0	−4.7	100.0	100.0	−4.7
Addendum:									
Negative income	.1	.5	.1	.0	.0	.0	.1	.3	.1

Source: Reproduced from Nelson (1987), 96.

one of its components, corporate income, can be compared in terms independent of current tax law in table 11.11. In addition, the table shows distributions of individual income tax and individual and corporate tax liabilities that held before the Tax Reform Act of 1986. The major components of adjusted gross income and taxable income (including deductions, adjustments, and exemptions) under 1983 and 1988 law are shown for each AGI class in table 11.12. Both the number of returns and dollar amounts are given. Many of the same AGI and taxable income components under 1983 and 1988 law are given in table 11.13, but are distributed according to FEI rather than AGI. In addition, table 11.13 presents distributions of FEI components that are not included in AGI, such as food stamps, welfare benefits, health and medical insurance, and the net rental value of owner-occupied housing.

Two current policy concerns place new emphasis on the revenue and tax burden consequences of single tax provisions and sets of provisions, in addition to the overall tax burden consequences of current law. First, the process leading to the Tax Reform Act of 1986 involved evaluating the distributional consequences of alternative packages of rate reductions and base broadening proposals. The initial goal (U.S. Treasury 1984) of distributional and revenue neutrality evolved into a final goal of equitable distribution of the tax reductions that had been achieved (U.S. Congress, JCT 1987). To achieve these goals and maintain them through postreform proposals for changes in the law requires knowledge of the changes in the distribution of tax burden resulting from changes in individual provisions and from interactions among

Table 11.11 **Distributional Comparisons of Corporate and Family Economic Income, and Individual and Corporate Income Tax Liabilities (1983 levels, 1988 law)**

Family Economic Income ($1,000s)	FEI (%) (1)	Corporate Income (%) (2)	Distribution of 1988 Pre-TRA Law Tax Liabilities: Individual (%) (3)	Distribution of 1988 Pre-TRA Law Tax Liabilities: Individual and Corporate (%)[a] (4)
<0	−.24	.23	.10	.12
0–10	3.23	1.24	.47	.58
10–15	5.28	2.29	1.67	1.77
15–20	6.85	3.76	3.22	3.30
20–30	16.08	10.65	10.51	10.53
30–50	29.88	23.26	26.29	25.83
50–100	26.85	31.89	30.98	31.12
100–200	6.15	12.70	10.63	10.94
200+	5.89	13.99	16.13	15.81
Total	100.00	100.00	100.00	100.00

Source: Reproduced from Nelson (1987), 88.

[a]Assumes corporate income taxes are distributed in proportion to corporate income in family economic income.

Table 11.12 **All Returns: Gross Income, Adjustments, Deductions, Exemptions, Taxable Income, and Taxes under 1983 and 1988 Law (1983 level and distribution of income; no. of returns in thousands, amounts in $ millions)**

		Wages and Salaries		Interest		Dividends in AGI		Business Income or Loss		Capital Gains in AGI		Pensions in AGI	
AGI Class* (000)	No. of Returns (1)	No. of Returns (2)	Amount (3)	No. of Returns (4)	Amount (5)	No. of Returns (6)	Amount (7)	No. of Returns (8)	Amount (9)	No. of Returns (10)	Amount (11)	No. of Returns (12)	Amount (13)
1983 law:													
Under 10	34,647	28,943	149,475	11,832	20,558	2,107	3,696	2,667	(286)	1,620	4,273	2,425	8,832
10–15	13,907	11,740	143,294	6,083	16,460	1,016	1,845	1,186	4,433	757	1,025	1,864	11,480
15–20	10,836	9,462	160,580	5,431	14,276	1,004	2,724	1,128	5,161	787	994	1,301	9,841
20–30	16,466	15,119	367,359	9,990	23,740	1,828	4,772	1,898	9,365	1,665	1,825	1,484	12,653
30–50	15,358	14,286	518,333	11,644	35,755	2,721	8,334	1,957	15,280	2,403	5,234	1,631	17,119
50–100	4,293	3,798	208,398	3,830	25,546	1,799	10,767	791	15,094	1,624	6,882	520	7,892
100–200	623	498	49,527	605	9,598	427	6,640	158	6,291	410	5,547	76	1,365
200 and over	161	130	34,781	159	7,871	130	8,427	45	9,937	126	18,595	17	632
Total	96,293	83,976	1,631,745	49,574	153,803	11,032	47,205	9,830	65,276	9,392	44,375	9,317	69,814
1988 law:													
Under 10	35,166	29,079	149,860	11,832	20,558	2,945	3,998	2,669	(285)	1,533	11,011	2,943	11,612
10–15	13,969	11,740	143,294	6,083	16,460	1,473	2,029	1,188	4,433	757	2,756	2,006	12,697
15–20	10,850	9,462	160,580	5,431	14,276	1,438	2,891	1,128	5,161	786	2,759	1,380	10,426
20–30	16,474	15,119	367,359	9,990	23,740	2,896	5,102	1,898	9,365	1,665	5,454	1,538	13,490
30–50	15,363	14,286	518,333	11,644	35,755	4,337	8,923	1,957	15,280	2,408	13,979	1,728	18,021
50–100	4,293	3,798	208,398	3,830	25,546	2,268	11,138	791	15,094	1,625	18,111	565	8,444
100–200	623	498	49,527	605	9,598	475	6,724	158	6,291	411	14,112	80	1,448
200 and over	161	130	34,781	159	7,871	139	8,452	45	9,937	126	46,414	18	712
Total	96,900	84,111	1,632,130	49,574	153,803	15,971	49,258	9,834	65,276	9,312	114,597	10,258	76,851

Table 11.12 *(Continued)*

AGI Class* (000)	Net Rents, Royalties, Partnership, etc., and Farm Income		Social Security Benefits in AGI		Other Gross Income		Total Gross Income		Moving Expense		Employee Business Expense		Two-Earner Deduction	
	No. of Returns (14)	Amount (15)	No. of Returns (16)	Amount (17)	No. of Returns (18)	Amount (19)	No. of Returns (20)	Amount (21)	No. of Returns (22)	Amount (23)	No. of Returns (24)	Amount (25)	No. of Returns (26)	Amount (27)
1983 law:														
Under 10	3,047	(28,006)			1,849	(9,186)	34,594	149,347	199	263	501	1,352	679	241
10–15	1,329	(529)			1,649	1,084	13,907	179,090	296	450	717	1,642	1,195	645
15–20	1,354	(490)			2,266	2,378	10,836	195,461	215	309	882	1,705	1,754	1,248
20–30	2,480	(362)			5,046	5,466	16,466	424,814	347	720	1,728	3,225	5,116	4,827
30–50	3,070	(16)			6,089	5,521	15,358	605,551	324	1,054	2,163	4,428	7,063	8,727
50–100	1,645	3,821			1,719	2,992	4,293	281,389	123	625	749	1,997	1,704	2,485
100–200	446	5,034			249	1,223	623	85,224	27	221	98	526	129	217
200 and over	137	7,407			75	991	161	88,639	3	31	19	157	27	56
Total	13,508	(13,141)			18,941	10,470	96,240	2,009,516	1,533	3,671	6,857	15,033	17,666	18,445
1988 law:														
Under 10	3,066	(18,193)	3	13	13,470	(9,491)	35,116	169,060						
10–15	1,331	74	15	19	7,568	1,021	13,969	182,763						
15–20	1,358	51	157	157	7,236	2,608	10,850	198,750						
20–30	2,480	608	1,482	2,418	13,112	8,563	16,474	433,676						
30–50	3,070	1,800	1,793	4,539	13,687	11,597	15,363	623,679						
50–100	1,644	7,421	615	1,637	4,144	5,916	4,293	300,065						
100–200	446	8,142	111	391	610	2,569	623	98,409						
200 and over	137	11,041	33	124	160	2,096	161	121,302						
Total	13,531	10,943	4,210	9,298	59,988	24,879	96,850	2,127,702						

continued

Table 11.12 *(Continued)*

AGI Class* (000)	IRAs		Other Adjustments		Total Adjustments		AGI		No. of Non-itemizers	Amount of Standard Deduction	No. of Itemizers	Amount of Excess Itemized Deductions	Total No. of Exemptions	Value of Exemptions
	No. of Returns	Amount	No. of Returns	Amount	No. of Returns	Amount	No. of Returns	Amount						
	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)
1983 law:														
Under 10	608	1,021	1,226	2,556	2,464	5,434	34,593	143,914	32,105		2,542	7,968	60,620	60,620
10–15	977	1,996	1,213	1,082	3,194	5,814	13,907	173,276	10,931		2,977	11,211	32,113	32,113
15–20	1,250	2,638	1,242	663	3,679	6,563	10,836	188,899	6,965		3.872	12,830	27,992	27,992
20–30	2,892	6,567	2,402	1,335	8,233	16,674	16,466	408,141	7,137		9,330	38,021	47,960	47,960
30–50	4,960	12,336	2,950	2,286	10,605	28,804	15,358	576,749	3,021		12,338	71,075	50,175	50,175
50–100	2,496	6,288	1,161	2,185	3,364	13,573	4,293	267,816	318		3,975	41,388	14,525	14,525
100–200	361	953	190	991	462	2,890	623	82,333	33		590	13,224	2,147	2,147
200 and over	107	260	44	414	125	917	161	87,722	7		155	12,804	560	560
Total	13,649	32,060	10,427	11,512	32,126	80,668	96,239	1,928,850	60,516		35,778	208,521	236,092	236,092
1988 law:														
Under 10	339	496	956	1,185	1,252	1,682	35,116	167,538	33,379	98,483	1,788	12,914	56,279	70,576
10–15	502	914	1,117	648	1,556	1,562	13,969	181,395	11,594	38,765	2,376	16,018	29,100	46,038
15–20	614	1,138	1,210	578	1,741	1,716	10,850	197,236	8,143	28,197	2,707	17,706	25,992	41,859
20–30	1,437	2,769	2,402	1,335	3,615	4,104	16,474	429,954	9,378	34,644	7,096	50,746	45,953	74,304
30–50	1,847	2,435	2,950	2,286	4,431	4,721	15,363	619,479	5,047	20,133	10,317	88,521	48,440	78,557
50–100	380	434	1,161	2,185	1,442	2,619	4,293	297,682	630	2,578	3,663	46,839	13,746	22,282
100–200	44	62	190	991	222	1,053	623	97,416	46	192	577	13,614	1,941	3,148
200 and over	10	16	44	414	51	430	161	120,890	10	43	151	12,090	496	805
Total	5,173	8,265	10,029	9,621	14,308	17,886	96,850	2,111,590	68,226	223,036	28,675	258,443	221,948	337,569

Table 11.12 *(Continued)*

AGI Class* (000)	Taxable Income		Taxable Income Less ZBA		Tax Before Credits		Credits		Alternative Minimum Tax (AMT)		Earned Income Credit (EIC)		Net Income Tax Liability	
	No. of Returns (42)	Amount (43)	No. of Returns (44)	Amount (45)	No. of Returns (46)	Amount (47)	No. of Returns (48)	Amount (49)	No. of Returns (50)	Amount (51)	No. of Returns (52)	Amount (53)	No. of Returns (54)	Amount (55)
1983 law:														
Under 10	29,536	112,771	19,428	53,156	19,403	6,705	1,192	234	14	253	6,208	1,770	22,428	4,972
10–15	13,650	131,241	13,387	94,647	13,397	13,514	1,894	581	7	38	0	0	13,232	12,990
15–20	10,789	148,359	10,716	117,710	10,716	18,237	1,992	690	4	23	0	0	10,534	17,607
20–30	16,420	322,522	16,373	272,667	16,371	46,734	4,213	1,311	18	69	0	0	16,265	45,542
30–50	15,339	455,734	15,328	405,938	15,328	80,804	5,272	1,850	77	293	0	0	15,300	79,307
50–100	4,280	212,122	4,278	198,047	4,277	51,674	1,941	1,341	108	749	0	0	4,278	51,149
100–200	620	67,088	620	65,064	620	23,265	390	848	51	710	0	0	622	23,157
200 and over	160	74,522	160	74,001	160	34,360	123	975	20	1,251	0	0	161	34,674
Total	90,794	1,524,360	80,291	1,281,230	89,273	275,293	17,017	7,829	299	3,386	6,207	1,771	82,822	269,398
1988 law:														
Under 10	18,895	56,737			18,907	9,206	969	118	30	228	6,603	3,838	24,196	5,482
10–15	12,873	83,574			12,883	12,652	1,707	377	2	3	3,788	1,080	13,621	11,200
15–20	10,738	109,883			10,738	16,698	1,751	386	5	8	274	8	10,694	16,312
20–30	16,394	270,637			16,394	43,794	3,596	741	9	18	0	0	16,381	43,067
30–50	15,353	432,420			15,353	77,692	4,311	966	30	57	0	0	15,353	76,778
50–100	4,287	226,162			4,287	51,455	1,710	546	57	99	0	0	4,288	51,001
100–200	622	80,538			622	22,323	371	336	43	123	0	0	623	22,107
200 and over	161	108,052			161	30,421	121	314	18	208	0	0	161	30,312
Total	79,322	1,368,003			79,345	264,242	14,535	3,785	195	745	10,665	4,926	85,318	256,258

Source: Reproduced from Nunns (1987), 104–7.
*Adjusted gross income (AGI) as defined under 1983 law.

Table 11.13 **Tax Return Income, Additional Items in Economic Income, and Tax Items for Families in 1983 (1983 tax law, 1983 level and distribution of income; no. of families in thousands, amounts in $ millions)**

		Wages and Salaries		Interest		Dividends in AGI		Business Income or Loss		Capital Gains in AGI		Pensions in AGI	
Economic Income Class[a] (000)	No. of Families (1)	No. of Families (2)	Amount (3)	No. of Families (4)	Amount (5)	No. of Families (6)	Amount (7)	No. of Families (8)	Amount (9)	No. of Families (10)	Amount (11)	No. of Families (12)	Amount (13)
Under 10	14,531	5,628	24,678	2,841	6,510	371	721	784	(3,269)	484	2,521	1,057	7,989
10–15	12,067	7,625	62,478	4,006	11,387	666	693	940	2,102	534	933	1,424	8,982
15–20	11,177	8,329	98,678	4,373	12,178	734	1,202	994	2,779	594	946	1,215	7,675
20–30	18,498	15,211	269,529	8,934	23,357	1,573	3,250	1,932	6,335	1,423	2,208	1,922	12,926
30–50	21,745	19,426	559,272	13,752	36,823	2,730	6,319	2,709	12,183	2,431	4,470	2,095	15,383
50–100	11,653	10,609	478,760	9,421	38,842	3,457	12,975	1,869	19,604	2,733	7,144	1,293	12,965
100–200	1,326	1,103	81,758	1,263	13,498	869	9,316	384	11,839	765	5,740	197	2,862
200 and over	364	295	56,593	358	11,207	298	12,728	122	13,703	270	20,413	41	1,033
Total	91,361	68,227	1,631,746	44,948	153,802	10,697	47,205	9,735	65,275	9,233	44,375	9,244	69,814

Table 11.13 *(Continued)*

Economic Income Class[a] (000)	Net Rents, Royalties, Partnership, etc., and Farm Income		Other Gross Income		Total Gross Income		Moving Expenses		Employee Business Expense		Two-earner Deduction		IRAs	
	No. of Families (14)	Amount (15)	No. of Families (16)	Amount (17)	No. of Families (18)	Amount (19)	No. of Families (20)	Amount (21)	No. of Families (22)	Amount (23)	No. of Families (24)	Amount (25)	No. of Families (26)	Amount (27)
Under 10	934	(15,902)	562	(3,836)	7,473	19,411	39	61	107	368	124	37	56	69
10–15	946	(1,172)	787	134	9,612	85,534	118	163	287	646	407	156	294	512
15–20	1,118	(903)	1,319	842	9,750	123,396	178	269	504	1,083	871	450	551	1,041
20–30	2,244	(946)	3,701	3,318	17,025	319,973	348	563	1,349	2,821	3,137	2,289	1,832	3,839
30–50	3,696	(1,339)	6,999	5,585	20,804	638,689	486	1,124	2,576	4,760	7,456	7,791	4,806	11,316
50–100	3,239	1,346	4,664	4,162	11,389	575,793	314	1,112	1,745	3,992	5,174	6,905	5,026	12,687
100–200	819	3,226	534	892	1,319	129,131	38	289	224	1,020	426	688	788	2,035
200 and over	302	2,549	165	(627)	364	117,597	9	89	46	342	70	130	220	562
Total	13,297	(13,141)	18,729	10,470	77,734	2,009,525	1,531	3,671	6,839	15,033	17,666	18,445	13,572	32,059

continued

Table 11.13 *(Continued)*

Economic Income Class[a] (000)	Other Adjustments		Total Adjustments		AGI		Adjustments to AGI under 1983 Law		Amount of Unreported Income	Total Social Security and RR Retirement		Addendum: Nontaxed SS and RR under 1988 Tax Law	
	No. of Families (28)	Amount (29)	No. of Families (30)	Amount (31)	No. of Families (32)	Amount (33)	No. of Families (34)	Amount (35)	(36)	No. of Families (37)	Amount (38)	No. of Families (39)	Amount (40)
Under 10	301	567	486	1,103	7,473	18,309	873	621	20,127	7,107	31,861	7,101	31,686
10–15	623	646	1,285	2,124	9,612	83,410	1,749	1,245	18,196	4,717	28,791	4,715	28,200
15–20	820	706	2,103	3,549	9,750	119,847	2,466	2,137	21,889	3,691	23,985	3,689	23,190
20–30	1,988	1,505	6,096	11,013	17,025	308,961	6,713	7,329	43,189	5,280	34,291	5,279	32,328
30–50	3,487	2,093	11,957	27,081	20,804	611,610	12,893	20,646	62,100	4,985	33,652	4,982	28,150
50–100	2,569	2,872	8,439	27,548	11,389	548,247	9,280	21,985	51,212	2,589	17,129	2,588	11,992
100–200	448	1,884	1,041	5,909	1,319	123,223	1,229	4,252	14,657	332	2,314	332	1,360
200 and over	116	1,237	278	2,342	364	115,254	352	1,611	20,535	82	577	82	304
Total	10,353	11,512	31,684	80,668	77,734	1,928,862	35,554	59,827	251,903	28,782	172,601	28,768	157,210

Table 11.13 *(Continued)*

Economic Income Class[a] (000)	Unemployment Compensation		Workmen's Compensation		Veterans' Benefits		Food Stamps		Welfare Benefits		Pension and Profit Sharing Plans		Health and Medical Insurance	
	No. of Families (41)	Amount (42)	No. of Families (43)	Amount (44)	No. of Families (45)	Amount (46)	No. of Families (47)	Amount (48)	No. of Families (49)	Amount (50)	No. of Families (51)	Amount (52)	No. of Families (53)	Amount (54)
Under 10	906	1,331	297	553	612	1,209	3,437	3,516	2,820	6,863	2,211	749	2,282	1,758
10–15	1,537	3,024	423	920	459	1,207	2,838	3,201	1,698	4,879	3,712	2,083	4,072	3,996
15–20	1,587	3,666	513	1,071	479	1,576	1,962	2,221	1,215	3,526	4,759	3,826	5,201	5,848
20–30	1,983	5,107	1,044	2,779	847	3,124	1,786	2,029	1,262	3,974	10,421	13,040	11,293	14,347
30–50	1,218	2,776	1,454	4,181	925	3,685	738	1,037	682	2,396	16,208	33,491	16,842	27,480
50–100	617	1,354	732	2,204	471	1,658	133	249	174	677	9,825	33,498	9,838	20,636
100–200	55	133	41	120	43	255	7	13	4	19	1,019	6,056	1,006	2,282
200 and over	5	8	14	39	4	18	0	0	0	0	274	4,377	266	613
Total	7,907	17,399	4,518	11,868	3,839	12,731	10,900	12,266	7,856	22,333	48,428	97,120	50,800	76,960

continued

Table 11.13 *(Continued)*

Economic Income Class[a] (000)	Military Benefits and Fringe Benefits		Other Untaxed Employer Contributions		Less: Taxable Pensions		Earnings on Pension Funds		Earnings on Life Insurance, IRAs and Keoghs		Real Pretax Corporate Economic Income		Less: Dividends before Exclusion	
	No. of Families (55)	Amount (56)	No. of Families (57)	Amount (58)	No. of Families (59)	Amount (60)	No. of Families (61)	Amount (62)	No. of Families (63)	Amount (64)	No. of Families (65)	Amount (66)	No. of Families (67)	Amount (68)
Under 10	2,134	467	2,959	78	2,215	(10,476)	2,478	791	2,027	213	6,066	3,269	806	(848)
10–15	2,916	1,278	5,007	250	1,986	(10,233)	4,126	2,757	3,300	469	7,340	5,111	1,048	(882)
15–20	3,325	1,866	6,195	440	1,539	(8,663)	5,177	4,320	4,054	803	8,057	8,411	1,131	(1,364)
20–30	6,321	4,211	12,849	1,377	2,331	(14,130)	11,102	13,032	8,798	2,432	15,385	23,807	2,457	(3,595)
30–50	9,237	7,035	18,288	3,358	2,485	(16,390)	16,801	27,732	13,721	6,769	20,394	52,013	4,483	(6,900)
50–100	5,670	5,423	10,328	3,204	1,478	(13,693)	10,124	31,261	9,376	8,274	11,442	71,310	4,698	(13,719)
100–200	644	942	1,055	473	209	(2,875)	1,057	6,147	1,209	2,667	1,319	28,408	969	(9,492)
200 and over	174	684	282	183	44	(1,036)	281	3,390	325	1,195	361	31,288	316	(12,788)
Total	30,421	21,908	56,963	9,364	12,287	(77,496)	51,146	89,430	42,809	22,822	70,365	223,617	15,908	(49,587)

Table 11.13 (*Continued*)

Economic Income Class[a] (000)	Less: Dividends of Pension and Insurance Funds		Less: Capital Gains in AGI		Real Net Capital Gains Except Securities		Inflation Adjustment for Interest Received		Inflation Adjustment for All Other Income		Excess Tax Depreciation		Tax Exempt Interest	
	No. of Families (69)	Amount (70)	No. of Families (71)	Amount (72)	No. of Families (73)	Amount (74)	No. of Families (75)	Amount (76)	No. of Families (77)	Amount (78)	No. of Families (79)	Amount (80)	No. of Families (81)	Amount (82)
Under 10	4,007	(175)	484	(2,521)	462	165	5,826	(2,762)	1,287	1,948	1,152	1,275	6	35
10–15	6,092	(595)	534	(933)	476	(71)	8,020	(5,160)	1,106	616	1,234	478	16	27
15–20	7,052	(932)	594	(946)	534	230	8,582	(5,897)	1,205	723	1,381	550	21	19
20–30	14,021	(2,809)	1,423	(2,208)	1,285	388	15,950	(12,639)	2,333	1,588	2,687	1,190	114	111
30–50	19,188	(6,004)	2,431	(4,470)	2,196	1,152	20,493	(22,214)	3,804	2,777	4,433	1,946	290	456
50–100	11,080	(6,782)	2,733	(7,144)	2,545	2,949	11,416	(24,348)	3,393	3,287	3,642	2,366	444	1,374
100–200	1,254	(1,362)	765	(5,740)	712	2,141	1,315	(8,003)	922	2,056	876	1,472	299	3,056
200 and over	337	(750)	270	(20,413)	261	14,712	364	(6,989)	317	2,975	307	2,103	178	5,927
Total	63,032	(19,410)	9,233	(44,375)	8,470	21,665	71,966	(88,012)	14,365	15,972	15,713	11,381	1,367	11,005

continued

Table 11.13 *(Continued)*

Economic Income Class[a] (000)	Real Net Rental Value of Owner Occupied Housing		Other Economic Income		Total Adjustment from 1983 Law AGI to Economic Income		Economic Income of Families		No. of Non-itemizers (91)	No. of Itemizers (92)	Amount of Excess Itemized Deductions (93)	Total No. of Exemptions (94)	Value of Exemptions (95)
	No. of Families (83)	Amount (84)	No. of Families (85)	Amount (86)	No. of Families (87)	Amount (88)	No. of Families (89)	Amount (90)					
Under 10	5,724	4,512	54	3,390	14,469	67,949	14,530	86,257	13,819	713	3,630	14,203	14,203
10–15	6,221	7,693	34	444	12,055	68,793	12,067	152,203	10,633	1,435	6,026	22,486	22,486
15–20	6,393	7,824	25	417	11,169	77,544	11,177	197,391	8,951	2,225	8,064	25,747	25,747
20–30	11,278	11,780	41	877	18,486	154,615	18,498	463,575	12,229	6,269	24,918	50,505	50,505
30–50	15,172	9,556	98	1,743	21,745	249,998	21,745	861,603	9,019	12,727	62,650	71,403	71,403
50–100	9,371	9,515	109	1,928	11,653	225,804	11,653	774,044	2,566	9,087	66,350	44,910	44,910
100–200	1,189	2,784	66	1,332	1,326	54,107	1,326	177,329	125	1,201	19,086	5,395	5,395
200 and over	326	1,694	70	4,478	364	54,432	364	169,684	24	341	17,796	1,447	1,447
Total	55,673	55,357	498	14,608	91,267	953,243	91,360	2,882,085	57,365	33,998	208,520	236,097	236,097

Table 11.13 *(Continued)*

Economic Income Class[a] (000)	Taxable Income		Tax before Credits		Credits		Alternative Minimum Tax (AMT)		Earned Income Credit (EIC)		Net Income Tax Liability	
	No. of Families (96)	Amount (97)	No. of Families (98)	Amount (99)	No. of Families (100)	Amount (101)	No. of Families (102)	Amount (103)	No. of Families (104)	Amount (105)	No. of Families (106)	Amount (107)
Under 10	5,325	22,561	3,441	1,642	348	88	11	228	1,307	407	4,343	1,383
10–15	8,784	58,210	7,318	5,140	817	174	6	22	2,331	655	8,259	4,336
15–20	9,351	87,944	8,468	9,236	1,204	368	4	17	1,297	351	8,967	8,544
20–30	16,715	236,079	16,114	29,356	3,047	912	12	41	863	237	16,213	28,280
30–50	20,658	480,334	20,469	72,609	5,862	1,834	45	244	340	99	20,445	70,967
50–100	11,343	439,812	11,316	85,049	4,516	2,014	105	498	65	21	11,294	83,607
100–200	1,306	100,049	1,304	29,145	770	1,007	72	601	2	1	1,307	28,791
200 and over	356	99,372	356	43,133	275	1,424	43	1,733	1	0	359	43,517
Total	73,838	1,524,361	68,787	275,311	16,838	7,822	299	3,384	6,206	1,771	71,187	269,425

Source: Reproduced from Nunns (1987), 125–28.

provisions. Second, the Gramm-Rudman-Hollings budget constraint imposes a search for revenue neutrality for expenditure proposals that the postreform era suggests should also be distributionally neutral. Consequently, the tax model is being called upon to aid in examining the changes in tax burden of proposed financing of expenditure provisions, such as extending Medicare to include catastrophic health care, that previously would have been unlikely to entail explicit tax policy concerns.

Data availability and frequency have improved markedly since the tax burden studies of the 1930s. But for some policy questions, the necessary data still do not exist, and for other questions, the data are available only from several separate surveys and not jointly. The series of tax burden measures that could be considered during the tax reform process depended on data availability. The OTA model uses statistical matching techniques to join information from several surveys together to form synthetic data files. For example, a statistical match joined similar records in the Statistics of Income and the CPS. Where data are available only through smaller surveys, such as consumption data from the Consumer Expenditure Survey, imputations are made to records in the larger surveys. The matching and imputation techniques themselves can introduce problems, as discussed in the context of microdata problems. Another problem is that those data that do exist rarely coincide in their reference periods and availability. One or more of the data sets usually must be extrapolated forward to a common base year, in addition to extrapolations needed to move the final tax model database forward to the current year and to the federal budget period, a period roughly five years into the future.

Several of the gaps are highlighted in the process of creating a Haig-Simons income concept. The process requires information on income, wealth, consumption, and taxes for each unit, family, or individual in the tax model database (Nelson 1987). Among the necessary data, wealth data are the most scarce both in frequency of collection and size of sample (see Lipsey and Tice 1989). In this, gaps in data for tax policy needs coincide with one of the major statistical gaps noted by the current American Economic Association report on U.S. economic statistics (Juster 1988). For example, in the 1983 Survey of Consumer Finances was the first national survey of the income, wealth, and financial behavior of households since the 1963 Survey of Financial Characteristics of Consumers. The 1983 Survey of Consumer Finances surveyed 5,400 households, a sample size sufficient to generate reliable national estimates of wealth components and distributions (Juster 1988; Avery, Elliehausen, and Kennickell 1988), but small compared to the 75,000-observation Statistics of Income and 120,000-observation CPS samples. Moreover, the Survey of Consumer Finances sample size for cross-classifications of interest for tax policy (e.g., specific income sources for households by age and income groups) quickly becomes very small. The CPS provides information on income and transfer payments for a very large sample but has well-known

nonresponse patterns that reduce the usable sample, especially for high incomes (David et al. 1986). Furthermore, some taxed income may not be suitable for inclusion in a Haig-Simons income measure, such as nominal capital gains and pensions.

The SIPP data have many more observations than the Survey of Consumer Finances, but tend to show lower wealth totals, with the shortfalls occurring in sources (such as small business equity, closely held corporate equity, real estate other than own home, etc.) of considerable policy interest. Tax return data in the Statistics of Income provide fairly detailed data on income that is taxable under current law, but not on untaxed income. Moreover, tax returns lack the details on the composition of that income and the rates of return it reflects that are necessary components of indirect wealth calculations.

Another important gap is data on employee benefits. Federal tax policy excludes many employee benefits from taxable income in exchange for imposing regulations intended to extend those benefits to more, usually lower income, workers. Policymakers need to know whether the benefits accrue as intended and whether workers and employers trade them for other benefits or higher money wages. As papers presented at a previous conference have shown (Triplett 1983), such data are scant. Some data are available on benefit characteristics and costs together with information on the employer and employee (Wood 1988), but the level of aggregation is high (one-digit industry and three occupational classes) and neither financial characteristics of the employer nor other demographic and economic characteristics of the worker are available. Similarly, there are some household surveys that collect information on the incidence of fringe benefits (the CPS and SIPP occasionally do so), but usually lack employer expenditures and most characteristics of the employer.

For some current policy concerns, the Haig-Simons income concept yields disconcerting tax burden results. Consider, for example, comparing the tax burdens of the elderly and the nonelderly. Under the Haig-Simons accrual concept, pensions enter income of the worker as the employer contributes to the pension fund and as the fund earns a return on contributions and do not enter the income of the retiree when the pension benefit is received. Tabulations of income and tax burden for the elderly alone, as would be prepared, for example, for alternative proposals changing the personal exemption levels available to the elderly, produce theoretically correct but intuitively anomalous results. Retirees whose income sources are taxable pension income are shown as having tax liability but no current income.

Capital gains present the same problem. Gains are included in economic income when they accrue, but tax is paid when the gains are realized, which often occurs in a period different from the accruals. Taxpayers in any period who realize capital gains appear to have tax liabilities out of proportion to their measured income.

Changes in the underlying demographic structure of the population present challenges to tax policy as well as to social policy. The inadequacies of exist-

ing data for describing changes in forms of family units, work patterns over the life cycle, intrafamily resource allocations, and so forth, make the available measures of tax burden no better than any of the traditional measures of household income, wealth, or savings.

11.8 Conclusions

The course of tax legislation throughout the last 50 years consistently considered and was shaped by conclusions based on tax burden measures. Assessments of where the tax burden falls determined the form taken by tax increases or decreases (e.g., the choice between excise and income taxes) and influenced the structure of specific taxes (e.g., in linking personal exemptions and standard deductions to the poverty level in the federal income tax or in apportioning rate changes among tax brackets).

The history of empirical tax burden measurement reflects the broad outlines of developments in economics over the same period. Theoretical and methodological advances, new computing technologies, and new sources and kinds of data all produced new measures of tax burden. At the same time, tax burden measures have theoretical foundations only as firm as the economic theories and the corresponding structures of partial, general, and dynamic models that underlie them. In this theoretical arena, much remains open for further research, whether in terms of incidence theory (in microdata models, general equilibrium models, or dynamic models) or the choice among broader welfare measures (in general equilibrium models). Computational algorithms for solving general equilibrium models are becoming more efficient, and the introduction of duality theory to general equilibrium modeling reduces the number of required computations. Current computing technology makes microsimulation models of increasingly detailed analyses a standard feature of the policymakers' ordinary tool kit.

Pragmatic constraints to microsimulation models stem primarily from the limits of data availability and the reliability of imputation and statistical matching and extrapolation techniques employed to compensate for those limits. These constraints, shared with other economic and social policy applications, will apply for the near future. Improved tax burden measures for policy uses are more likely to come from advances in incidence and measurement theory that allow stronger inferences from a static supply of data.

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Comment

Martin H. David

The Framework for Burden Studies

Atrostic and Nunns undertake an ambitious survey of the methodology and empirical basis for understanding the "burden of taxation." My remarks complement their review and focus on four topics: scope, evaluation, error, and new data requirements. Let me begin by reviewing their definitions and framework. Early in the discussion the authors state:

> A tax is a compulsory payment to the government from which the taxpayer recevies no direct benefit. . . . Payment of taxes, through lower factor incomes or higher product prices, reduces a taxpayer's real income. Tax burden measures attempt to quantify this decrease in utility and to evaluate the decrease against a measure of ability to pay. . . . Taxation also imposes administrative and compliance costs.

Table 11C.1 relates this definition to other kinds of payments and receipts that are relevant to understanding the welfare of individuals. The table considers both taxes and transfers. The distinction between coercive and voluntary payments is paralleled by a division of transfers into entitlements (automatic receipts) and means tested (or conditional receipts). The quid pro quo corresponding to payment or receipts is classified by the nature of the corresponding change utility that derives from change in consumption bundles available.

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Table 11C.1 Payments Relevant for "Burden" Analysis

Quid pro quo (Direct Benefit or Cost)	Nature of Transaction			
	Compulsory		Voluntary	
	Payment	Receipt	Payment	Receipt
None	1. "Pure" taxation			
Nonexclusive	2. Property taxes		Contributions	5. In-kind transfers
Exclusive	3. FICA	4. EITC	Consumption	Factor sales
				6. Cash transfers

The case mentioned by Atrostic and Nunns, no change in real goods and services is what I will call category 1, one of three important cases. The others are cases in which the payment generates benefits for large numbers of persons, that is, nonexclusive benefits (category 2), and cases in which the payment generates a benefit that is specific to the individual making payment, or exclusive benefits (category 3).

It is important to note that a substantial part of government finance corresponds to entries other than category 1, which the authors use as their definition of taxes. Atrostic and Nunns point out that "tax burden" studies have generally been limited to a study of income, property, sales, and payroll taxes, numbered 1–4 in table 11C.1. They mention that property taxes and payroll taxes may be "benefit taxes" under some ideal system of equilibration in the marketplace that includes "voting with your feet" and complete certainty of lifetime endowments.

The separability of taxes, transfers, and expenditures in the analysis of "burden" does not really work: the existence of tax features such as EITC and personal exemptions make it clear that some aspects of the compulsory tax system have similar effects on the consumer's budget constraint to elements of the cash transfer system. A complete understanding of the vertical equity of the behavior of the fisc would clearly be incomplete without considering transfers. Problems of integrating tax and transfer systems are significant (and have occupied analysts in several of the major pieces of tax legislation over the past 20 years).

Some Features of the Tax System Substitute for Voluntary Expenditures

For example, tax deductibility of charitable contributions matches "tax expenditures" to the outlays of consumers in their voluntary budgeting of consumption. These points suggest a first difficulty in burden analysis:

Problem 1. "Pure" tax burden studies are too limited. The burden of revenue raising must account for the benefits (costs) of other kinds of taxes and transfers. Debate on the size of public sector requires an understanding of the burden of both financial and real consequences of government activity.

An accepted understanding of "burden" among economists today is welfare

loss. Measures of welfare loss are based on three conceptual foundations. The most carefully articulated is that an analytic relationship exists between the raising of revenues by altering after-tax prices and the dead-weight loss (DWL) of the system. That is, the excess of the rise in the expenditure function over the yield of the tax system. Deriving burden in this framework requires an explicit measure of parameters of the utility function.

The second and third conceptual foundations of dead-weight loss were more prominent in discussions of political economy a generation ago, but deal with problems of public choice. A collective agreement must be reached on whose utility function is to be used in burden analysis. That is, some characteristics of taxpayers create heterogeneity of tastes. (For example, large families will consume more food and housing than small families with a given income. This difference in behavior has been considered relevant to taxation and is recognized in the existence of personal exemptions, tax rate schedules, and standard deductions.) Heterogeneity in tastes can be recognized by including relevant characteristics of taxpayers in the estimation of utility parameters. The converse is that characteristics that are not considered relevant for discrimination in the design of tax/transfer systems must be disregarded in estimating the parameters of the utility function (and ignored in policy making). Musgrave (1959) implicitly recognizes this idea in his definition of horizontal equity.

The third conceptual framework is related to the second. Vertical equity implies an understanding of the marginal utility of income (wealth of endowment) as income increases. Marginal utility must decline, and it must decline more than some critical rate to assure that the socially desired tax system is not regressive in relation to income (endowment).

Problem 2. Burden relates to utility and dead-weight loss. Measurement of burden reflects an implicit consensus on relevant heterogeneity, which becomes embedded in parameter estimates. Subsistence and satiation imply that the marginal utility of increases to the endowment must fall.

We note that none of the tables presented by Atrostic and Nunns shows burden in this utility sense. (Two difficulties have been critical: developing acceptable equivalence scales and modeling intertemporal choices of consumers.)

Implementation of these notions of burden measurement requires data on endowments, spending behaviors, and income-producing behaviors of the population (aggregated into decision units). This creates the third major problem for burden studies.

Problem 3. Empirical data on the joint distribution of endowment, leisure, consumption, and lifetime accumulation are needed to estimate utility functions and to determine the distribution of burden in the population.

The various methods used to estimate burden described by Atrostic and Nunns overcome the three problems of scope, utility, and data requirements in a variety of ways.

Representative Taxpayer Methods

The representative taxpayer approach ignores all three problems. It assumes values for the taxpayer's endowment and deductively applies a tax rule to demonstrate an outcome variable. The approach survives because it gives an intuitive understanding. It fails to be informative because (*a*) there are no measures of the importance of the cases simulated, (*b*) the method does not admit avoidance responses, and (*c*) no measure of compliance cost can be generated. It fails to be scientific because no understanding of the quantitative importance of examples can be generated. While the scientific value of this method is small, we need to learn from its effectiveness in communicating to policy makers. The tabulation of individual taxpayers with more than $1,000,000 of AGI who paid no taxes, beginning in the mid-seventies, and the subsequent tabulation of corporate taxpayers with no liabilities after 1981 strongly motivated the subsequent tax legislation.

Aggregative Data Studies

The methods used in aggregative data studies approach at least one of the three problems. The data problem is circumvented by aggregation. It is assumed that all data on households refer to the same universe, or decision makers. Second, shifts in the expectation of conditioning variables are assumed to "cause" shifts in the mean response of decision makers. Third, the universe of decision makers is exogenous to the policy experiments being carried out. Work by Reynolds and Smolensky (1977) and Gillepsie (1965) needs to be cited because they consciously attempt to deal with the burden of both transfers and public-good producing expenditures of government. Aaron and McGuire (1970) attempted, and their work is unusual, to account for the declining marginal utility of consumption, thereby tackling the second problem cited.

The aggregative studies give modest insight into reality including the effects of avoidance behaviors on the status quo. The scientific shortcomings of such studies are that they offer no basis for ascertaining error and they incorporate little or no behavioral response in calculating the tax burden under counterfactual conditions. Such studies are always limited by some principle for classifying the population. Once selected, no alternative perspective on the population is possible.

Microdata Studies

Microdata studies offer several orders of magnitude of improvement on the aggregative studies. They replace the concentration on means in the aggregative method with a procedure that permits nonzero covariance among variables assembled from different data sources. (In the language of survey specialists, a procedure akin to mean imputation is replaced by mean plus empirical error distribution for the statistically matched cases.)

The convenience of the microdata methods is flexibility. The statistically matched data set implicitly contains the information required to display burden calculations in a number of dimensions. Curiously, this flexibility has seldom been used to display the inherent variability of the population, as in tables 11.7 and 11.9. Furthermore, little has been done with analysis of heterogeneity in the population and a concern to understand the second problem more deeply.

The most neglected research on statistically matched data is the study of error. I repeat criticisms raised repeatedly, most recently by Smeeding (1980). We know almost nothing about the variance in the statistical matching process. While efforts have concentrated on minimizing the distance between two records for a match, almost nothing has been done on three easily studied questions. (*a*) We have knowledge of exact matched tax, income, and benefit data. Simulation of statistical matches on those data would give a clearer understanding of the error involved in the process used by the OTA to generate its individual income tax model. (*b*) As Kadane (1978) suggested, evidence on the missing partial correlations that is currently ignored in the statistical matching process should be gathered and incorporated into the procedure. (*c*) Rubin (1987) advocates multiple matching (multiple imputation) so that we can know the variance that is generated by the algorithm for matching and can calculate better measures of association that depend on the imputation. None of these ways of improving statistical matches is beyond our current capabilities and all would help us understand the robustness of the representation of the distribution of population characteristics that we use in microsimulation.

Other high priorities for the micromodel are to add estimates of compliance costs to allow us to compare tax systems that are correct but difficult to administer with tax systems that are pragmatic and consider real resource costs involved in compliance and administration. Ott and Ott (1969) and H & R Block (Roper Organization 1977) provide data that could be used for such measures.

I would urge that the classifier used in discriminating the effects of a tax system on vertical equity should relate to wealth, rather than income. The total of physical capital, financial capital, and human capital should be estimated for each economic decision unit, and burden should be tabulated in classes based on that total. This allows us to consider the effect of tax laws on the distribution of burden between generations and to incorporate an estimate of unrealized capital gains.

General Equilibrium Modeling

The Treasury's general equilibrium (GE) model is the most sophisticated and the most vulnerable basis for assessing burden. The GE makes use of parameters of the utility function. It integrates consumption, saving, and factor supply decisions within a household population. And it models the total response of the economy to a change in tax structure. (It is paradoxical that

the GE models incorporate utility functions, yet have seldom been used to assess questions of vertical equity, while the microsimulation models that use no utility framework, have been relied upon for that purpose.) Over the past 20 years we have learned a number of critical facts about GE modeling.

Disaggregation of GE Models from Two Sectors and Two Factors Is Essential

Shoven (1976) demonstrated that variation in the tax system within the corporate manufacturing sector produced as much welfare loss as the distinctions between corporate and noncorporate enterprises. Mieszkowski (1972) demonstrated without a doubt that the land factor must be considered separately from reproducible capital and labor because of its relation to nontradable goods and immobile factors. Feldstein (1977) considered the importance of land as a vehicle for transferring wealth over time.

What we have not yet learned is how much disaggregation is informative. The greater the number of sectors, factors, and assets, the more complex the problem of "calibrating" the model and estimating underlying price data. At what point such disaggregation ceases to be informative because the errors in the data overwhelm the signal, we do not presently know. It seems essential to test the robustness of our present understandings to variations in the degree of disaggregation, a computational experiment that has been notably absent in the literature.

Variations in the Cost of Capital

We have learned that cost of capital varies widely by industry, asset type (Fullerton, Gillette, and Mackie 1988), legal organization, and financing arrangements (King 1977). We have not yet learned how to harness this price variation to an understanding of the economy. Fullerton and Henderson (1987) assume values for critical elasticities of substitution that determine the sensitivity of legal organization and asset composition to relative cost of capital. Needless to say, the results are not convincing as a description of real economic processes. A major effort must be made to develop behavioral models of these responses based on observational data.

Tax Law Asymmetries

We have learned that tax law asymmetries sharply differentiate the marginal consequences of investment between firms that carry forward losses and firms that do not (Altshuler and Auerbach 1987). GE models have not yet incorporated this critical fact.

Elasticities of Substitution in Energy and Labor

We have learned that the elasticities of substitution between energy and capital, and between energy and labor, are substantial (Berndt and Wood 1979). The modeling of "value added" by CES functions of labor and capital

in combination with a Leontief fixed-coefficient matrix determining the demand for intermediate product is clearly a poor representation of this knowledge. More generally, the production sector is curiously flexible in substitutions between capital and labor and totally inflexible in the use of intermediate products. This weakness can and should be remedied.

The GE model makes no attempt to deal with behavioral responses to transfers and rules out problems in measuring burden that arise from public expenditures. The GE model incorporates a utility function that lacks the subsistence parameters that have been common in consumer demand systems and which would be critical for understanding relative burden of the poor and the rich. The model is not estimated, and no information is generated on the errors entailed in its policy simulation.

Scientific evaluation of the GE model calls for a variety of approaches. Reestimation of production and consumption submodels with state of the art functional forms is a beginning. Perhaps more important is to understand the appropriate degrees of aggregation in this undertaking. As with macromodeling in general, more sectors and more representative consumers do not necessarily add to our understanding of the economy. Just as in the field of scientific sample design, information gains must be balanced against costs—in this case costs of estimation and model solution.

Process of Research on Tax Burden

Up to now the government has been a monopolist with control of the major databases used in tax burden studies. It has limited access to information generated by its models, and it has attempted to control legislative processes by asserting point estimates for the effects of changes in tax legislation. In the future this process can and should be radically different. The capability already exists in the private sector to emulate the microsimulations carried on by the Treasury. What is lacking is an institution that allows access to the databases for scientific research by nonpartisan economists. Models for such access exist—and are described in Smeeding, Rainwater, and O'Higgins (1988) and McGuckin and Pascoe (1988). The technology exists to make this type of access inexpensive and within reach of solo researchers, as we have demonstrated with SIPP-ACCESS at the University of Wisconsin (National Research Council 1988; David 1985).

It will be important to coordinate the efforts of the Treasury, the Congressional Budget Office, and the Department of Health and Human Services to achieve the integration of tax and transfer considerations in a single microcomputer model. We know what to do. The potential to learn more than we have in the last 50 years is enormous.

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Comment Joseph A. Pechman

Atrostic and Nunns have prepared a comprehensive history of the development of measures of the distribution of tax burdens. I thought I might supplement their excellent account with some observations about the development of microdata files, with which I was closely associated. I would also like to suggest what might be done to improve the state of knowledge about the distribution of income and taxes.

My first encounter with microdata files occurred in the late 1930s, when I was assistant director of the Wisconsin Income Study. This study, which originated under the auspices of the Conference on Research in Income and Wealth, provided tabulations and, later, analyses of Wisconsin income tax returns for the years 1929–36 (Hanna, Lerner, and Pechman 1948). I believe that this was one of the first large-scale uses of computers in the analysis of the distribution of income and taxes. Because of the limitations of these early computers, the tabulations were generally of the Statistics of Income variety. We also had a longitudinal sample of returns for the years 1929–36 and were able to prepare income distributions for 2, 3, . . . , 7 years. I was aware of the potential use of computers for simulation exercises, but the computers were much too slow and primitive for this purpose.

The work on income distribution after World War II was carried forward mainly by Selma Goldsmith and her associates Maurice Liebenberg and Hyman Kaitz in the Department of Commerce (Office of Business Economics 1953; Goldsmith et al. 1954). Liebenberg and I had been members of a small staff at the Office of Price Administration, headed by Hildegarde Kneeland, which prepared estimates of the distribution of income for the purpose of estimating the taxes needed to reduce consumption to manageable levels during the war (Office of Price Administration 1943). We were all aware of the limitations of consumer expenditure surveys and tabulations of tax returns for income distribution purposes. These early efforts relied heavily on statistical (and even graphic) techniques to project earlier distributions (for example, the 1935–36 consumer income and expenditure survey of the National Resources Planning Board) to subsequent years and to estimate the upper tail of the distribution. Later, the Office of Business Economics (now the Bureau of Economic Analysis) began publishing annual distributions of income that were based on tax return data and the Census Bureau's Current Population Surveys

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(CPS), but these estimates were suspended because of the cost of preparing them and concern about their accuracy.

The first use of a tax model or tax file was in 1961, when I persuaded Internal Revenue Service Commissioner Mortimor Caplin to make available to Brookings a sub sample from the Statistics of Income. Stanley Surrey, who was Assistant Secretary of the Treasury for Tax Policy at the time, supported my request to obtain the tax file for research purposes. The first file, which was for the year 1960, was used to make estimates of marginal and effective tax rates by income classes and to simulate the revenue and distributional consequences of structural changes in the tax system (Pechman 1965a). In those early days, the programming was done by Donald Tucker, then a young graduate student at MIT. When the Treasury began to realize the potential of the tax file, it soon organized a small staff to prepare its own estimates of the effects of administration and congressional tax legislative proposals. At Brookings, we have used the annual tax files almost continuously since those early days to analyze the distributional effects of changes in the tax law (see, e.g., Pechman 1965b).

The idea of merging the tax and CPS survey data to estimate a "correct" distribution of tax burdens occurred to me during the 1950s, when I was attempting to make estimates of the progressivity of the tax system. Colm and Tarasov in the late 1930s and Musgrave et al. (1951) in the late 1940s had used survey data to make such estimates, but I was acutely aware of the limitations of those data, particularly in the top income classes. Moreover, the use of microdata rather than grouped data to estimate tax liabilities would give us greater accuracy and more flexibility in the calculations that could be made, particularly for the top and bottom tails of the income distribution.

The first MERGE file was created at Brookings in the early 1970s. It was a statistical match between the 1966 tax file and the 1967 Survey of Economic Opportunity, which contained income and consumption data for 1966 (Pechman and Okner 1974). Later, we prepared MERGE files on the basis of the CPS surveys for the years 1970 and 1975. I was fortunate to have as my associates in this enterprise Ben Okner and Joe Minarik, who developed the computer techniques for matching large data sets. These files provided the basis for the preparation of detailed estimates of the distribution of tax burdens by income classes for 1966, 1970, 1975, 1980, and 1985 (Pechman 1985).

In principle, a MERGE file should provide accurate estimates of the distribution of tax burdens by the social and economic characteristics of the population. The most common breakdown is by income classes, but comparisons by size of family, home ownership vs. rental, age groups of family heads, and sources of income are also possible. In addition, estimates of the variability of tax burdens within various population groups can be calculated (see tables 11.7 and 11.8 of Atrostic and Nunns). Of course, all measures of tax burden depend on the incidence assumptions used and these are by no means settled by the public finance fraternity. I have presented eight different sets of inci-

dence assumptions that span the range of opinion in the profession about tax incidence.

Several others have also prepared MERGE files, but the number is relatively small because of the time-consuming and costly nature of the operation. The Treasury has produced several files for its purposes, most recently to estimate the effects of the big tax reform that was finally enacted in 1986. The Congressional Budget Office has also prepared similar files to estimate changes in the distribution of tax burdens between 1975 and 1990. Peat, Marwick, and Main has a MERGE file for a recent year. There may be others in existence, but I am not aware of them.

There are two criticisms of the MERGE file technique, only one of which I agree with. The first is that statistical matching may not provide an accurate picture of the composition of income by income classes. I am not qualified to pass judgement on this criticism, but I have a hunch that the error, if any, is small.

The other criticism is one that I myself have expressed many times. The problem is that the top tail of the Consumer Population Surveys does not resemble the tail of the income distribution that we know exists from tax returns. My associates and I have simply spliced on the tax tail to the survey data and made corresponding reductions in the number of family units in the lower part of the distribution to arrive at an overall distribution of income. I am not sure what the others have done, but I suspect they make approximately similar adjustments. Considering the advanced state of our technology, it is criminal that we are forced to use such an unsophisticated technique for so important a purpose.

The remedy is to prepare an *exact* match between the Census CPS distributions, tax returns, and other administrative records, such as the Social Security records. An exact match would automatically provide accurate data on the composition of income of the sample units and would also tell us what correction needs to be made to the upper tail of the distribution. I will leave it to the statisticians to devise techniques for splicing the tax return data onto the CPS data in the top tail of the distribution.

An exact match has been completed by federal agencies at least twice in the past to my knowledge—for 1963 and 1973 (Social Security Administration 1980 and 1981). The procedures were very time-consuming, so that the results were ancient history when they were finally published. It seems to me that the time has come to plan for exact matches, say, once in every two or three years to provide the basis for accurate MERGE files, complete with breakdowns by income sources, demographic and employment data, and family status. Since there will be problems of confidentiality, this project must be undertaken by a federal agency, probably the Bureau of the Census, and should be released as promptly as possible.

In closing, I should like to urge the Bureau of Economic Analysis to resume its work on income distribution. The availability of the microdata from tax

returns and the CPS surveys should make it easier to estimate the distribution of income. If BEA were to resume its income distribution work, it could help promote the idea of making periodic exact matches within government circles. It is time to emerge from the primitive stage and to enter the much more advanced stage that modern technology permits.

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