THE LIFETIME INCIDENCE
OF STATE AND LOCAL TAXES:
MEASURING CHANGES
DURING THE 1980s

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ABSTRACT

I compute the lifetime tax incidence of the major state and local taxes used in the United States during the 1980s. Using data from the Consumer Expenditure Survey, I show that over the life cycle, general sales taxes are progressive and equally as progressive as state and local income taxes. While the progressivity of sales taxes has not changed between 1984 and 1989, income taxes have become less progressive over that five-year period. Property taxes on the other hand have become more progressive. The system of state and local taxes is mildly progressive over the life cycle and has become slightly more progressive between 1984 and 1989. Finally, eliminating deductibility for sales taxes in 1986 appears to have had little effect on the overall progressivity of the tax system.

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I. Introduction

The 1980s has been a time of considerable change for state and local tax systems. In particular, the Tax Reform Act of 1986 (TRA86) had a substantial effect on state and local taxes both directly and indirectly. Directly, the deduction for general sales taxes was eliminated and the fall in federal marginal tax rates reduced the value of the remaining deductions for taxpayers. In addition, states that based their tax systems on the federal income tax had unintended windfall revenue gains and losses as the tax base broadened and rates fell. Indirectly, the tax reform spirit spread through the states sparking tax reform efforts in many states. Many of the state tax changes were a combination of an effort to reform taxes to increase progressivity as well as an effort to undo any windfall gains and losses. One goal of this paper is to measure how effective state and local governments were at altering the progressivity of their tax systems.

A second goal of this paper is to re-examine some commonly held beliefs about the relative progressivity of different state and local taxes. The tax reform debate at the state level described above has operated from a pair of simple received truths: income taxes are progressive, sales taxes are regressive. The prescription for increasing progressivity, it is thus argued, is to move from sales to income taxation. One consequence of this belief is that politicians who have tried to raise sales taxes to cope with the fiscal crisis facing their states in the early 1990s have been attacked for increasing a regressive tax.

1

In this paper I call into question these beliefs about the relative progressivity of state and local income versus sales taxes. There are three major reasons why income taxes may not be substantially more progressive than sales taxes. First, a lifetime income analysis is likely to make the sales tax look less regressive and the income tax less progressive than an annual income analysis. This occurs because the variation in income due to life cycle effects is eliminated as a cause of variations in tax incidence. This should tend to move taxes toward proportionality[1]. Second, federal tax deductibility of state and local taxes affects the ultimate incidence. After 1986, sales taxes were not deductible at the federal level. This will tend to make sales taxes more progressive and income and property taxes less progressive. Finally, many states exempt items with low income elasticities from sales taxation. For example, the majority of states do not apply the general sales tax to food consumed at home. Again, this will tend to increase the progressivity of this tax.

In this paper, I undertake an analysis of the major state and local taxes used in the 1980s that takes account of these three factors. I begin by examining trends in state and local tax collections during the 1980s with some particular attention paid to the response to the Tax Reform Act of 1986 (TRA86). I then turn to examining the incidence of three important taxes used at the state and local level: general sales, personal income, and property

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[1] While this need not be so, most studies of tax incidence using a lifetime income perspective have found that taxes move toward proportionality. See for example Davies et al. (1984).

2

taxes. I construct distributional tables for the years 1984 and 1989 using both an annual income measure and a measure which proxies for lifetime income for individuals. Finally I use the results of the incidence analysis to make some comments about the overall progressivity of state and local tax systems and about trends in the progressivity during the 1980s.

In brief, I find that if one takes a lifetime perspective for the incidence analysis, the general sales tax is progressive and in fact equally as progressive as the income tax. I also find that the state and local tax system is slightly progressive and became more progressive between 1984 and 1989.

II. Trends in State and Local Tax Collections

Figure 1 graphs aggregate tax shares for different taxes through the 1980s.[2] The main change in tax shares at the state level has been the growth in the importance of personal income taxes increasing from 28.9% of tax collections in fiscal year 1980 to 33.7% in 1990. This growth has come largely at the expense of selective sales and corporate income taxes. The linkage of state income taxes to federal income taxes is made clear by observing the sharp increase in importance of the state income tax in 1987. This reflects the windfall that states collected as the federal tax base

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[2] I have not corrected for miscategorizing that occurs when tax collections are reported in the Annual Survey of Governments. The size of the necessary correction is small and does not affect the trends illustrated in these graphs. See Metcalf (1992) for a discussion of this issue.

was broadened as well as capital gains realizations that occurred in 1986.[3]

Also clear from figure 1 is the importance of personal income, general sales and selective sales taxes at the state level. By 1990, these three taxes accounted for 85% of the tax collections at the state level. Personal income and general sales taxes alone accounted for over two-thirds of total collections.

Figure 2 shows that property taxes dominate when state and local taxes are combined. Property taxes alone account for over three-quarters of local tax collections. At the local level, there has been a modest increase in the use of local sales taxes and a slight decrease in the importance of personal income taxes. Combining the two levels of government, personal income, general sales, and property taxes are the dominant taxes - amounting to 80% of state and local tax collections in 1990. Personal income and general sales tax shares have grown modestly while the property tax share has remained quite stable.

The traditional view of state and local taxes holds that sales and property taxes are regressive and income taxes progressive. For example a recent report released by the Center for the Study of the States notes that

"...the sales tax is the largest generator of state tax revenue, and the property tax accounts for nearly three-quarters of local taxes. Both tax a larger share of income from low-income households than from people at higher income levels. In other words, they are regressive. ... [M]ost states have at their disposal one major tax that is

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[3] These are fiscal year data. Thus capital gains realized (and subject to tax) in 1986 show up in fiscal year 1987 data.

4

progressive, the personal income tax." (Center for the Study of the States (1991), p.55)

Based on this wisdom, the aggregate tax share numbers suggest a gradual increase in progressivity of state and local tax systems during the 1980s if federal deductibility is ignored. The personal income tax share rose by about 2.2 percentage points while sales taxes fell by 0.6 percentage points. The fall in the corporate income tax share might offset the increased progressivity to the extent that this tax is progressive. Note, though, that the corporate income tax collects less than a quarter of the revenue of the personal income tax.

Of course, any statement about the progressivity of a tax system based on shares of tax instruments is inherently very rough. Aggregate figures mask much of the important policy discussion that occurred over the 1980s as policy makers responded to changes in federal tax policy as well as changes in the fiscal condition of their governments. In many states, a stable tax share was only achieved through significant changes in the tax laws.

Looking beyond the aggregate numbers, we can characterize the 1980s by breaking it down into four periods. The first period (1980-82) was a time of fiscal crisis for state and local governments. The combination of the recession and cuts in federal aid created great stresses for state and local tax systems. Fiscal year 1983 marks the beginning of the "tax reaction" period as states began to raise taxes. For the period 1982-83, 27 states increased their use of the personal income tax and 25 their use of the general sales tax (i.e. - raised rates or broadened the base).

5

In contrast, only 5 decreased their use of the income tax and 3 the sales tax.[4] As Gold (1991) has noted, the combination of increased taxes and the economy's recovery led to a surge in tax revenues in 1984. The years 1984-85 were a period of "wait and see" as debate over federal tax reform began in earnest. There was some retrenchment on the income tax (5 states enacted major increases while 25 enacted major decreases) and some growth in the sales tax (16 states enacted increases and 7 decreases).

Finally, the period after TRA86 (1987-90) was a period of budget stability and growth for state and local governments. Gold (1991) has documented the major changes in state taxes during this period. 28 states had major increases in taxes (revenue increases of at least 5%) while only 3 had major decreases (Gold, Table 4). 18 states increased the income tax while 12 decreased it to some extent. In contrast, 20 states increased their use of the sales tax while only 1 decreased its use.

Gold also documents the efforts by many state governments to make their income taxes more progressive. States broadened their income bases, increased standard deductions, and eliminated various tax shelters, among other things. Galper and Pollock (1988) analyzed tax reforms in 5 states after TRA86 and found that the income tax systems became more progressive after state tax reform.[5]

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[4] Data on tax changes prior to 1986 come from tables 51 and 52 in ACIR (1986).

[5] Galper and Pollock analyzed tax systems in California, Colorado, Nebraska, Oklahoma, and Virginia. The Suits index increased from as little as 0.0009 (Nebraska) to as much as 0.0557 (Virginia).

Finally, Greenstein and Hutchinson (1988) document efforts by state governments to reduce the number of low-income families on state tax rolls. They note that 31 of the 41 states with broad-based income taxes raised income tax thresholds thereby reducing the tax liability for low-income families.

The efforts by states to make their income tax systems more progressive, combined with reductions in federal marginal tax rates which reduce the value of deductibility, should combine to increase the progressivity of state taxes. Offsetting these efforts was the need for greater revenue and the resulting tax increases in many states. To see how these different trends ultimately affect the progressivity of state and local tax systems, I now turn to an analysis using data from the Consumer Expenditure Survey.

III. Measuring the Incidence of Taxes

In this study, I report measurements of the progressivity of various state and local taxes using data from the Consumer Expenditure Survey for 1984 and 1989. Before discussing the data, let me point out several assumptions that I make in the analysis.[6] First I must decide on an appropriate unit for analysis. Should this be the individual or the household? Because my data are from the CES, it will be convenient to make the household the unit of observation.[7] My second assumption determines the tax liability

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[6] For a short and elegant treatment of the issues involved in measuring both the incidence of tax systems as well as their progressivity, see Hines (1992).

[7] I have also done much of this analysis using per capita measures rather than household measures. The results are not significantly altered.

of each household. As is well known, the statutory and final incidence of a tax can be very different. The final incidence of a tax will depend on relative demand and supply elasticities for the good in question with purchasers of inelastically demanded goods (elastically supplied goods) bearing the burden of the tax. In addition to measuring the ultimate incidence of a tax, one must take into account federal deductibility of state taxes.[8] But here there is a conceptual issue. Should one attribute the change in tax burden from deductibility of state and local taxes to the federal tax or to state and local taxes? There is no correct answer to this question (and in fact the question becomes immaterial when considering the progressivity of the combined federal-state-local tax system).

I make the following incidence assumptions for the three taxes. For the income tax, I assume that the burden of the tax net of federal deductibility lies with the taxpayer. Put differently, the statutory incidence equals the final incidence. I also assume that the general sales tax burden lies with consumers (again net of federal deductibility). These incidence assumptions correspond to the assumptions made by Pechman (1985) and Musgrave, Case, and Leonard (1974) and are standard assumptions made in incidence studies of the sort I am undertaking.

There is less agreement about the incidence of the property tax. Three "views" of the property tax have been put forward.

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[8]   Some states also allow deductibility of federal taxes. I will ignore this complication in this analysis.

The first view (traditional view) holds that the tax is a combination of a tax on land and a tax on structures. In this case, the tax on land is borne by the landowner and the tax on structures can be shifted to tenants. For homeowners, this suggests that the property tax is borne by homeowners, while for tenants, some is shifted back to landlords. The second view (new view) is that the tax is a combination of a uniform national tax on capital and an excise on local capital. With this assumption the tax is in large part borne by owners of capital.[9] Finally, Hamilton (1976) has argued that the property tax is in fact a benefit tax (the benefit view), i.e. - a payment for government services received. In this case, one should properly worry about its incidence no more than we worry about the incidence of the price of a pair of sneakers. However, this view of the property tax depends on strong assumptions about zoning and mobility which are unlikely to be satisfied in practice. Furthermore, to the extent that political interest groups are important at the local level, the link between benefits received and taxes paid is likely to break down.

After eliminating the benefit view, we are left with the traditional and the new view of the property tax. Which view is appropriate in large part depends on what question is being asked.[10] If a single community is considering a reduction in its

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[9] In fact, as made operational in incidence studies, the new view typically holds that property taxes are entirely borne by owners of capital.

[10] Aaron (1975) makes this point very clearly.

9

property tax to be financed by lump sum aid from the state or federal government, the traditional view is relevant. For questions about the progressivity of the national system of property taxes at some point in time or changes in the progressivity of property taxes over a period of time, the new view is the appropriate point of view to take. Since this paper deals with the progressivity of the system of state and local taxes over the 1980s, I will take the new view and assume that property taxes are shifted to owners of capital.

My third assumption concerns the time frame for analysis. Traditionally, studies measured tax incidence using an annual measure of income for the analysis (e.g. Pechman (1985), Musgrave, Case, and Leonard (1974)). However, recent research has emphasized the importance of fluctuations in annual income and the realization that individuals to a great extent make consumption decisions based on their lifetime income. Individuals who appear to have low income may simply be in a low income period of their lives (e.g. the elderly and young adults). In fact, it is straightforward to construct models in which the population is made up of identical individuals with the same lifetime income and consumption profile in which the tax system can look sharply progressive or regressive on an annual income basis. In this study, I will take lifetime income as the appropriate time period for analysis.

The lifetime frame of reference is of particular importance at the low end of the income distribution. Many households with low annual income are by no means poor. Elderly households drawing

10

down savings and young families at the beginning of their careers may look very different when viewed from a lifetime versus an annual income perspective. Pechman (1985) acknowledged the measurement problem in his incidence analyses and simply dropped the bottom half of the lowest income decile from his analysis (see footnote 11 on page 51 of his book).

A final issue is the correct measure of income (whatever the time frame). In the context of an annual incidence analysis, the correct measure of income would be a Haig-Simons measure which included all earned and unearned income. As an accounting identity, Haig-Simons income equals consumption plus changes in the stock of wealth. Practically speaking, this is an impossible measure to obtain. Not only must we measure earned income, we must also measure capital income and accrued capital gains and losses in all assets (including any Picasso paintings one might happen to own). Lifetime income however is simply equal to assets held at death plus the sum of consumption over the lifetime. Ignoring bequests, if consumption is smooth over the life cycle, then annual consumption provides a good measure of lifetime income.

There have been two approaches to the measurement of lifetime income. The first approach is to find a panel of households or individuals for which income is well measured and impute the lifetime profile of income (see for example Lyon and Schwab (1991), Davies et al (1984) or Fullerton and Rogers (1991)). One difficulty with this approach is the inability to measure changes

11

in asset values which may lead to a systematic mismeasurement of lifetime income.

The second approach is to assume that consumption is relatively smooth over the life cycle and can serve as a proxy for lifetime income. This approach avoids the problem of needing to measure changes in wealth over the life cycle and has been used by Davies (1959, 1960), Poterba (1989, 1991), and CBO (1990) among others. Following this latter approach, I use current consumption as a proxy for lifetime income. Current consumption is defined as total expenditure less housing costs for homeowners and new vehicle purchases plus the housing rental value for homeowners and an imputed rental value for automobiles. For the imputed vehicle rental value, I follow Cutler and Katz (1991) and impute the value of new car purchases as a function of demographic characteristics of the household (age, non-vehicle spending, spending squared, income, family size, sex and education attainment of the household head). The imputed vehicle value is then multiplied by the number of vehicles owned and depreciated straight line over an eight-year period to obtain the rental value. Income, demographic and expenditure data come from the Consumer Expenditure Survey.

The Consumer Expenditure Survey interviews and collects detailed expenditure information on roughly 6,000 households every quarter. Each household is interviewed 5 times. The first interview collects demographic information and some expenditure information and is not reported to the public. The second through fifth interviews collect expenditure information during the

12

previous quarter. Income information is also collected in the second and fifth interviews. After the fifth interview, the household is dropped from the survey. Households which move during the series of interviews are dropped from the study. I will analyze CES data for 1984 and 1989 to bracket TRA86. I include households which begin their second interview in the first or second quarter of the year and have complete income information. For 1984 there are 1625 observations and 1526 observations for 1989. After constructing a gross tax liability for each household, I then use the NBER TAXSIM tax calculator to impute the value of federal deductibility for state and local taxes to construct a net-of-federal-tax state and local tax burden for households. In brief, TAXSIM is a set of FORTRAN routines which can be combined with data sets to compute federal tax liability. Its value lies in its flexibility. The value of deductions, for example, can be determined for individual tax returns by computing the tax liability with and without a particular deduction allowed. The difference yields the value of the deduction in lowering tax liability. Both the average and the marginal value of the deduction can be easily calculated.

Table 1 presents information on consumption and income by decile for the two years in the CES. There is considerable variation in consumption within a given income decile. In 1984, for example, from 16 to 54% of the households have expenditures at least 2 deciles away from their income decile. On average, 35% of the households are 2 or more consumption deciles away from their

13

income decile. The differences can be quite substantial. For example, over 6 percent of the households in the lowest income decile in 1984 had expenditures above the median in that year. The margins of the table report the upper limits for each of the first 9 deciles. Not surprisingly, consumption exceeds income in the lowest deciles.

The existence of considerable consumption variation within income deciles indicates the importance of carrying out the lifetime income tax incidence analysis. I now turn to a distributional analysis of the three most important personal taxes levied at the state and local level: the general sales tax, the personal income tax and the property tax. In all three cases, I estimate tax liabilities for each household and net out the value of the federal deduction for the tax in question. I then compute average tax burdens by both income and consumption decile.

III. A. The General Sales Tax

To estimate the general sales tax payments made by households in each year, I first construct weighted regional sales tax rates for six different categories of purchases: general sales, food, clothing, utilities, prescription drugs, and services.[11] I weight the state rates by aggregate income in each state. The rates are taken from the Annual Survey of Governments, "State Tax Collections" and are weighted averages of the tax rates at the beginning and end of the year, weighted by the month in which the

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[11] The CES only provides information on the location of households by region for urban households.

14

tax change became effective. Table 2. presents the regional tax rates for the two years. I then categorize expenditures by each of these six categories and apply the appropriate rate to compute a household's sales tax liability.

In 1984, individuals could take a federal deduction for general sales tax liability. Most households used the "look up" tables in the tax form which compute the deduction as a function of state of residence, family size, and adjusted gross income. To calculate the deduction for households in the CES, I used a two-step procedure, first estimating a probit model to predict the probability of taking a sales tax deduction. I compute the inverse Mills ratio from this regression and regress sales tax deductions on various characteristics of the household as well as the inverse Mills ratio for households with positive deductions. I use the 1984 set of tax returns in the Ernst and Young/University of Michigan Tax Panel. This panel contains a simple random sample of taxpayers for the years 1979 to 1986 taken from the IRS Statistics of Income data set of individual tax returns.[12] Table 3. presents results from the second stage regression. The regression results are quite plausible and the fit is reasonable.

Households with high adjusted gross income take larger deductions as do larger families. While I do not report the probit estimates, the estimated coefficient on the income dummy

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[12] There are 9,762 observations in the data set for 1984. I exclude 198 observations either because they nave non-positive adjusted gross income or because their income exceeds $200,000 and therefore their state identifier is deleted for confidentiality reasons.

15

variables increase sharply as income percentile increases as do the
t statistics. In all the probit regressions, I correctly predict
(in the sense of the predicted probability exceeding 0.50
indicating that a deduction is taken) 80% of the time.[13]

The estimated coefficients from the sales tax deduction
regression were applied to data in the CES to generate sales tax
deductions in this data set. If the predicted probability from the
probit regression was less than 0.50, I imputed a deduction of
zero; otherwise I used the second stage OLS regression to impute a
positive deduction. This method leads to 41% of the households
taking a deduction for sales taxes compared with 38% in the
University of Michigan data set for 1984. I then used TAXSIM to
compute federal income tax liabilities, first with the deduction
allowed and then without the deduction. The change in the tax
liability is subtracted from the sales tax payments to obtain sales
tax liability net of federal tax payments.

Table 4. reports average general sales tax burdens as a
fraction of income and consumption. The first and third columns
take annual income as the relevant measure of well being; in both
1984 and 1989 the general sales tax looks sharply regressive. The
ratio of the average tax burden in the first decile to the burden
in the tenth decile is 2.7 in 1984 and 1.8 in 1989. These findings

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[13] The chi square statistic (with 8 degrees freedom) for the
importance of the explanatory variables ranges from 926 to 4414.
Pseudo R^2s range from 0.326 to 0.366.

corroborate Pechman's results that sales and excise taxes are quite regressive using an annual income approach.[14]

However, the story is dramatically changed when consumption is used as the base. Now the sales tax is progressive with average tax burdens rising in both years (columns 2 and 4). The ratio of the average tax burden in the bottom decile to that in the top decile is 0.6 in both 1984 and 1989. These results suggest that concern over the regressivity of the general sales tax is misplaced and that the trend toward greater use of sales taxes at the state and local level has not appreciably increased the regressivity of the tax system[15],[16].

What effect has eliminating deductibility had on tax burdens by income groups? Using income as the appropriate measure of well being, it appears that eliminating deductibility of sales taxes reduced differences in tax burdens across deciles substantially.

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[14] "Sales and excise taxes are clearly regressive throughout the entire income scale. In 1980 they began at almost 18 percent of income at the bottom and declined to less than 1 percent at the top, reflecting the fact that the proportion of family income spent on goods and services subject to tax falls as income rises." (Pechman (1985), p.55)

[15] Of course, to the extent that these taxes replace more progressive taxes, the system becomes more regressive. But the results presented here suggest that the reliance on the general sales tax should not make state and local taxes regressive.

[16] While I do not consider selective sales taxes in this study, previous studies suggest that these taxes are less regressive when consumption is used to measure economic well being. For example, a Congressional Budget Office study (CBO (1990)) found that federal excise taxes for cigarettes and motor fuels are roughly proportional and taxes for alcoholic beverages are slightly progressive when taxes are expressed as a fraction of current expenditures. Cigarette, alcohol and motor fuels taxes account for over half the excise tax collections at the state level.

However, the importance of eliminating deductibility appears to diminish when consumption is used as the base.

To isolate the importance of federal deductibility, I computed distributional tables by income/consumption classes for 1984 gross of the federal tax deduction. While these numbers do not control for any behavioral responses resulting from deductibility, they provide a first cut at understanding the role of deductibility in the incidence of sales taxes. Table 5 decomposes the change in average tax burdens between 1984 and 1989 into changes in 1984 from deductibility to non-deductibility and then to non-deductibility in 1989. Using either income or consumption as the measure of well-being, eliminating deductibility increased the progressivity of the general sales tax as average tax burdens rose in the upper deciles. However this increase in progressivity was offset by increases in average tax burdens in the lower deciles that exceeded the increases in tax burdens for upper deciles in most cases. The consumption analysis suggests that every expenditure group experienced an increase in tax burden and that it was fairly evenly distributed across deciles. Put differently, the increases in progressivity that resulted from the elimination of deductibility were offset in large part by increases in the tax burden for lower consumption deciles.

III. B. Personal Income Taxes

Table 6. presents distributional tables for state and local income taxes. The CES reports state and local income tax payments in three variables: 1) an annualized amount of taxes withheld from

18

paychecks, 2) any additional payments made and 3) any refund.   In

theory, one should be able to add the first two amounts and

subtract the third for a measure of income tax liability. However,

there is clearly some misreporting at work here, because, according

to this measure, roughly 20% of the households have negative state

and local income tax liabilities.[17] I take two approaches. I will

present results where I drop observations with negative income

taxes and another set of results where I set the negative tax

liability to zero.   In both cases, I once again use TAXSIM to

compute the change in federal tax liability due to eliminating the

deduction for state and local income taxes.   This change is then

subtracted from state/local income tax payments to arrive at a net-

of-federal tax personal income tax liability.

With either approach - dropping observations with negative

taxes or setting negative tax amounts to zero - the state and local

income tax is quite progressive. The consumption based measure of

average tax burden shows a sharp jump in the average tax burden

from the first to second decile in 1984 and then a more gradual

increase through the deciles. The ratio of the average tax burden

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[17]   The CES has notoriously poor income measures.
Unfortunately there is no other data set with extensive expenditure
and income information available.   Others (e.g. Berliant and
Strauss (1992)) have used tax data for incidence analysis.   These
data are marred by severe underreporting at the lower end of the
income distribution.   One approach that has been taken to the
problem of poor income data in the CES has been to combine the CES
with the PSID. See Lusardi (1992) or Caspersen and Metcalf (1992)
for applications of this approach. While this approach may give us
a better measure of lifetime income, it will not improve our
measure of state and local tax liabilities as the PSID does not
report this information.

19

in the highest to lowest deciles is 5.4 for consumption and 9.4 for income. Setting the observations with negative taxes to zero (table 7) changes the story only slightly.

No clear picture about trends in state and local income tax between 1984 and 1989 progressivity emerges from these tables. From table 6, the first, third, sixth, and eighth deciles had increases in average tax burdens (as a fraction of consumption). In contrast, the second, ninth, and tenth deciles experienced substantial decreases in tax burden. These declines for the top two deciles took place despite the decreased value of federal deductibility that occurred as top marginal tax rates fell from 50% to 33% (taking account of the bubble at the top of the tax schedule resulting from the phase-out provisions in the tax code) as well as efforts to make state income tax systems more progressive. These declines in fact suggest that state and local income taxes became less progressive between 1984 and 1989 despite reform at the state level.

III. C. Property Taxes

To compute the burden of local property taxes, I will assume that the property tax is shifted to owners of capital. I proceed by first estimating property tax burdens on all residential property and then by allocating the aggregate property taxes to owners of capital based on their share of aggregate capital income.

Estimating property tax burdens is complicated by the fact that we don't observe property taxes for rental housing. I used a two step estimation procedure to impute property taxes for tenants. In

20

the first step, I ran probit regressions by region for the presence of property taxes for homeowners on a set of housirg and demographic variables. This is an important first step as somewhere between 20 and 35% of the homeowners in different regions reported no property tax liability. I computed the inverse Mills ratio from this regression and added it to a regression of the property tax amount for homeowners in a region on the housing and demographic variables conditional on a positive property tax. Presumably property values (and property taxes) depend on housing characteristics (number of rooms, size of lot, etc.). To the extent that neighborhoods are homogeneous, characteristics of the homeowner should also help explain the level of property taxes. The composition of a neighborhood affects property taxes in large part through the demand for government services imposed by residents. The results of the second stage regression for 1984 are reported in table 8. Finally, I imputed property taxes to tenants as the fitted value from the second stage regression. After computing property tax payments for rental and owner occupied housing, I allocate the taxes net of the value of federal deductibility to households based on their share of capital income which is comprised of dividends, interest, rents, and pension income[18],[19].

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[18] Also included are royalties, estate and trust income and annuity income.

21

The property tax appears regressive (Table 9) though less so than if an annual income base is used. With income as the base, the effective tax rates first rise then fall in both 1984 and 1989. With consumption as the base, rates rise then fall in 1984 but are relatively flat in 1989. For the consumption based measure, the ratio of bottom to top decile average tax burden is 0.74 in 1984 and 1.22 in 1989. However there are sharp movements from the first to second deciles which make these ratios less meaningful than for the other taxes.

III. D. Measuring Tax Progressivity

The distributional tables are a useful construct for understanding the incidence of various taxes. However, they are not very helpful as summary statistics measuring the progressivity of the different taxes. Deriving a meaningful summary statistic is very difficult and a variety of measures have been proposed (see Kiefer (1983) for some discussion and Hines (1989) for a critique of these measures). While acknowledging that any individual summary measure of a tax system's progressivity is flawed, I think these measures can still be helpful in furthering our understanding of the progressivity of a tax system. In this section I report Suits indices for the different taxes as well as an aggregate Suits index for the three taxes together (see Suits (1977)). The Suits index is a tax-based analogue to the Gini Coefficient. It is

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[19]   I do not pass the value of the property tax deduction received by landlords forward to tenants in the form of lower rents.   Property taxes are a deductible business cost offsetting taxable income.   The deduction is already reflected in the rent that the tenant pays. I thank Louis Kaplow for pointing this out.

22

constructed from an income concentration curve, a graph of cumulative tax burden against cumulative income. A strictly proportional tax would have an income concentration curve which follows the 45 degree line. A progressive tax is likely to fall below the 45 degree line while a regressive tax would rise above the 45 degree line. The Suits index equals 1 minus the ratio of the area under the income concentration curve to the area under the 45 degree line. The index ranges from -1 to 1, with negative values indicating a regressive tax, 0 a proportional tax, and positive values a progressive tax. I compute the Suits index for each tax by approximating the area under the income concentration curve by a series of trapezoids created for each household ordered according to increasing consumption (or income, for an annual measure). A convenient property of the index which I will take advantage of is that the index for a system of taxes can be constructed as the weighted average of the indices for the individual taxes with average tax rates serving as weights.

Table 10 reports the Suits index for the three taxes as well as the system of taxes. Using consumption as a proxy for permanent income, the sales tax over the life cycle is progressive in both 1984 and 1989. As suggested by the distributional tables above, the increase in progressivity from eliminating deductibility was offset by changes in sales tax collections. One can't tell from these calculations whether the increased regressivity is due to changes in expenditure patterns or to changes in tax coverage and tax rates. Moving from an annual income approach to a lifetime

23

approach has a large effect for the sales tax, moving it from being a regressive tax in either year to a progressive tax.

The income tax is progressive using either an annual income or an expenditure analysis though it becomes less progressive under the latter approach.[20] In either case, the income tax has become less progressive between 1984 and 1989. This is in marked contrast to the analysis of Scott and Triest (1992) which shows the income tax becoming more progressive over this period. One possible reason for this difference is their use of federal income tax returns as the source of information for state tax payments. With the increased standard deduction and more generous exemptions after TRA86, many low income families no longer had to file federal returns. However, they still were required to file state returns in many states. Therefore studies using federal tax data will not attribute tax liability to low income households when in fact they may pay state income taxes.

Property taxes are regressive by the income base measure but less regressive (and in fact very slightly progressive in 1989) using the consumption base. Interestingly, the property tax has become more progressive between 1984 and 1989 when the lifetime income measure is used. The annual income analysis misses this trend and shows the property tax becoming more regressive.

The system of the general sales tax, personal income tax and property tax is slightly progressive under the lifetime income

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[20] The treatment of observations with negative income tax liabilities does not make any real difference. The Suits index computed when I set the negative values to zero is unchanged.

24

analysis. Moreover, the tax system has become slightly more progressive over the five year period. In contrast, the annual income analysis indicates that the tax system is regressive and has become more regressive over the five year period rather than more progressive.

What effect did the elimination of the deduction for sales taxes have on the overall progressivity of this system of taxes? Not much by this analysis. The Suits index increases slightly but only by about .004 for the lifetime income analysis. There are two reasons for the lack of a large effect. First, sales taxes as a fraction of income (or consumption) are small - on the order of 1 percent. Income taxes and property taxes take a larger bite out of income (consumption) - on the order of 2 to 3 percent. Therefore, the aggregate Suits index will be less affected by changes in the sales tax Suits index. Second, the sales tax deduction was never that large. Eliminating the deduction only increases the sales tax Suits index in 1984 for the consumption based analysis from .05 to .07. We should therefore not be too surprised that there is little change in the overall Suits index as a result of eliminating deductibility of sales taxes.

Perhaps the most surprising result in Table 10 is that by 1989 the sales tax was equally as progressive as the income tax using consumption as a proxy for lifetime income. This is in marked contrast to the annual income approach where the Suits Indices differ by 0.13. Any conclusion that the sales tax and income tax are equally progressive deserves further examination. One reason

25

for the large disparity between the annual and the lifetime income results may be due to my use of a national measure of tax progressivity. I might be lumping together wealthy individuals who live in states which impose a sales tax (e.g. New York) and poor individuals who live in states which do not impose a sales tax (e.g. New Hampshire). While the national system of sales taxes may be progressive, any one state's use of a sales tax might not be. For example, it could be that a sales tax in New York is regressive while the combination of New York and New Hampshire might lead to a progressive tax system.

While it would be preferable to compute measures for each state separately, I am unable to do so since the CES does not report state of residence. I can however narrow down considerably the state of residence of a subset of my sample using the additional information for residents of urban areas about the size of their urban area.[21] For example, there is only one state in the West region with an urban area with a population of more than 4 million (California). Thus the 49 households that live in the West with population greater than 4 million must live in California.[22] There are two urban areas in the Northeast that I can identify (Metropolitan New York and Philadelphia) and two in the Midwest

[21]   Doyle (1992) originally made the observation that additional information within the CES can be used to improve the knowledge of the household's state of residence. My approach is based on her research. I thank Jim Poterba for pointing her paper out to me.

[22]   BLS is obviously aware of this (from their point of view) problem. By the 1989 CES, they no longer report population size for the West region.

(Chicago and Detroit). There are 93 households in the Northeast urban areas in 1984 and 139 in 1989 while there are 60 in the Midwest urban areas in 1984 and 68 in 1989.

While greater disaggregation improves my ability to measure within-state tax progressivity, the number of observations falls sharply. I therefore also report sales tax Suits indices for the urban areas combined since all the states in which these areas exist rely substantially on sales taxes.[23] While not an ideal disaggregation, it is a serviceable first cut at identifying states with a considerable dependence on the sales tax.

The bottom part of Table 10 reports sales tax Suits Indices for these urban areas separately as well as together. The pattern of the national data holds. Focussing on the consumption based measures, the sales tax in the New York-Philadelphia metropolitan area as well as in Los Angeles is progressive in 1984 while the Chicago-Detroit measure is regressive. By 1989, both the New York-Philadelphia and the Chicago-Detroit areas had progressive sales taxes. Aggregating the urban areas, the Suits Index for 1984 is 0.04 in 1984 and 0.11 in 1989.[24]

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[23] New York State has a 4% sales tax while Pennsylvania has a 6% rate. Illinois has a 5% rate while Michigan has a 4% rate. Finally California has a 4.75% rate. In addition, many of these cities impose a local sales tax on top of the state rate. Including these taxes, the city rates would be 8.25% (New York), 6% (Philadelphia), 8% (Chicago), 4% (Detroit), and 6.5% (Los Angeles).

[24] Dropping the Los Angeles observations in 1984 to make the comparison more comparably across years decreases the Suits Index in 1984 to 0.01.

The trend between 1984 and 1989 is toward a more progressive sales tax - which suggests that eliminating federal deductibility had more of an effect on progressivity than the national data suggest. The last three rows present the Suits Index for 1984 excluding the value of federal deductibility. Federal deductibility matters more when we focus on within state variation.

The differences in trend results from 1984 to 1989 between the analysis using total variation in economic well being and the analysis using more within state variation suggests that further analysis using disaggregated data would be fruitful. However, the essential message of this paper remains unchanged: state sales taxes are progressive in a lifetime tax incidence framework.[25]

IV. Conclusion

We can summarize the results of this paper as follows. First, using a lifetime incidence approach, the general sales tax is progressive. Second, despite eliminating deductibility for this tax in 1986, there has been no appreciable change in the progressivity of this tax between 1984 and 1989. However, this result is sensitive to the decomposition of within versus across state variance. Further research on this point would be valuable. Third, as of 1989, the income tax is no more progressive than the sales tax. Fourth, the personal income tax appears to have become more regressive between 1984 and 1989. This is in contrast to the anecdotal evidence of Gold (1991) as well as work by Scott and

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[25] While not reported here, the measures of progressivity for the income and property taxes were unchanged when a more disaggregated analysis was undertaken.

28

Triest (1992) and Galper and Pollock (1988). Fifth, using a
lifetime income analysis, the property tax shifts from being a
regressive tax in 1984 to being a progressive tax in 1989, a shift
missed by the annual income analysis. Finally, the system of
general sales, income, and property taxes is progressive with a
slight increase in progressivity between 1984 and 1989.

In conclusion, let me mention a couple of caveats that should
be considered when interpreting the results. First, a major
difficulty with any incidence analysis of state and local taxes is
the issue of mobility. If a substantial fraction of households
live their working years in low income tax states and then move to
states with low sales taxes upon retirement, an incidence analysis
based on an individual state will overstate effective tax rates.
The problem is mitigated but by no means eliminated by considering
the incidence of the state and local tax system as a whole. The
problem will also exist whether we use an annual income or a
lifetime income measure for economic well-being. One would
probably have to do fairly elaborate simulations of consumption,
income, and mobility over the life cycle to overcome this problem.
That task is beyond the scope of this paper.

A second issue to consider is the presence of bequests.
Lifetime wealth can be consumed or bequeathed. Menchik and David
(1982) estimate that bequests as a function of lifetime earnings
fall up to the 80th percentile and then begin to rise again. The
bequest to lifetime earnings ratio at the 95th percentile just
exceeds the ratio at the 20th percentile (table 4, p. 198). Taking

29

these numbers at face value, they suggest that over most of the income distribution our proxy for lifetime income is biased downward with the bias particularly severe at the lowest end of the distribution. This in turn suggests that our measure of the progressivity of taxes over the life cycle is biased downward.

That the bequest to lifetime earnings ratio for the lowest decile exceeds that of the 95th percentile is somewhat surprising. Menchik and David compute lifetime earnings as the stream of earnings for a sample of individual taxpayers discounted forward to age 65.[26] Their measure (as they acknowledge) excludes inheritances. As Kotlikoff and Summers (1981) show, inheritances are a major source of wealth transmission between generations. Thus many of the individuals in Menchik and David's lowest decile may not in fact be poor but simply living off their capital. This illustrates the pitfalls of using longitudinal data to estimate lifetime income in the absence of wealth information.[27]

After correcting for the mismeasure of lifetime income at the bottom of the distribution, it is possible that the bequest to lifetime income ratio would rise with income. In this case, our measure of tax progressivity over the life cycle would be biased

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[26] They have an average of 14 years of data on individuals in their sample.

[27] Menchik and David argue that the exclusion of transfers in income can explain the high bequest to lifetime earnings ratio in the lowest decile. However as the authors note, public transfers for the cohort born between 1890-1900 (their sample) were small. It seems more plausible that the bias due to the exclusion of inheritances swamps any bias due to excluding transfers.

upward. Lacking a good measure of bequests as a ratio of lifetime income (earnings plus inheritances), I simply note the problem and point out that the bias due to ignoring bequests is not clear a priori.

Finally let me return to the issue of the property tax as a benefit tax. Implicit in this view is the belief that expenditure incidence should be considered hand in hand with tax incidence. This is a perfectly reasonable position. The tax incidence analysis conducted in this paper is only half the story. It will remain for future economists to analyze the life cycle incidence of state and local expenditures.
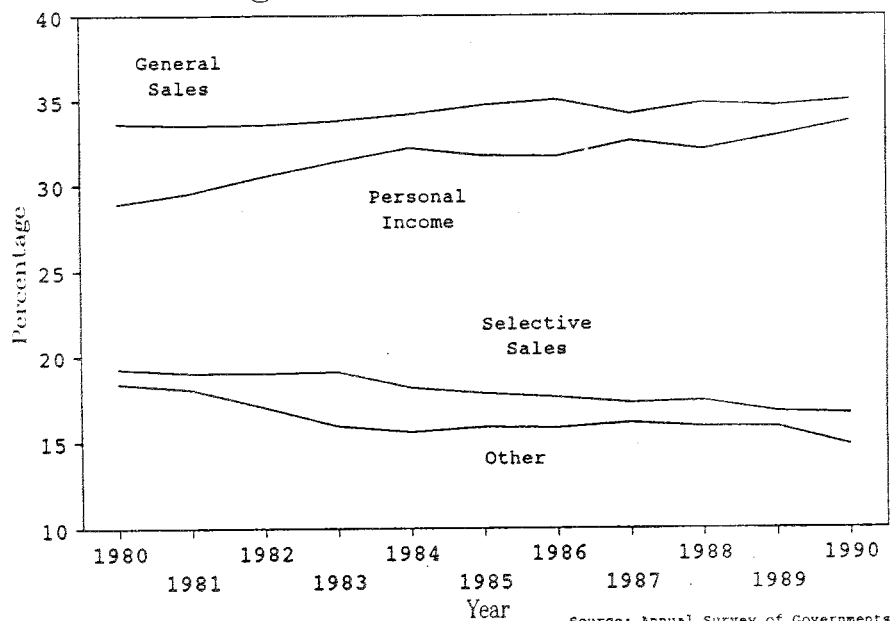
Figure 1. State Tax Shares

Source: Annual Survey of Governments

Figure 2. State and Local Tax Shares

Source: Annual Survey of Governments
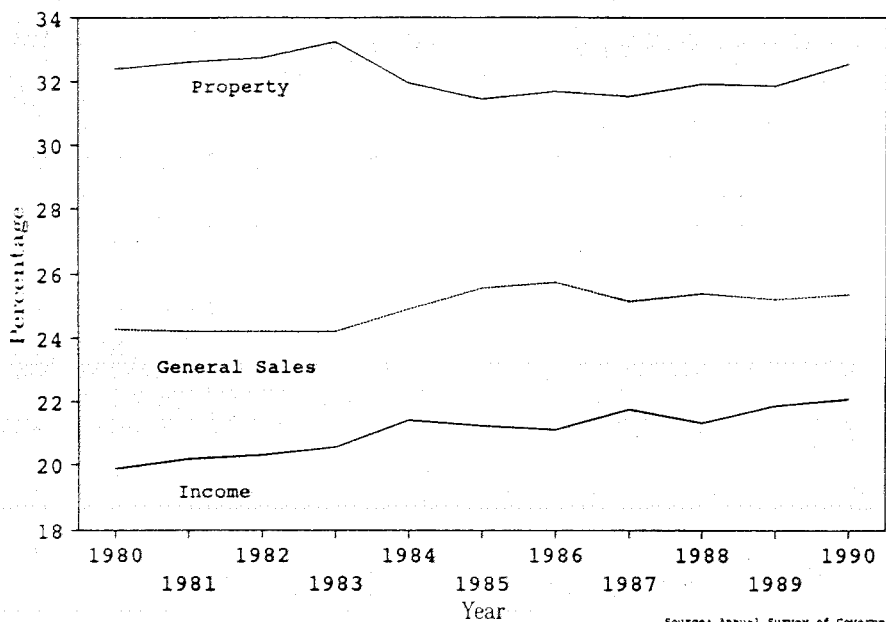
Table 1. Income and Consumption Deciles
in Consumer Consumption Survey

1984 Consumption Decile

Income Decile	1	2	3	4	5	6	7	8	9	10	Income Decile Cut-Offs
1	61.1	15.3	9.9	4.3	2.5	2.5	2.5	0.6	0.6	0.6	6,105
2	22.8	34.4	19.1	8.6	5.6	4.9	1.9	1.2	0.6	0.6	9,484
3	11.1	21.5	26.5	14.7	8.0	8.0	6.2	3.1	1.2	0.0	12,800
4	3.1	14.7	19.8	21.5	17.3	12.3	7.4	1.8	1.9	0.0	17,200
5	1.2	6.8	11.7	21.5	22.8	11.7	11.1	7.4	4.3	1.8	21,664
6	0.6	5.5	8.0	14.1	14.8	20.3	11.1	12.3	7.4	5.5	26,239
7	0.0	0.0	1.9	9.2	16.7	17.8	25.3	13.5	9.9	6.1	31,300
8	0.0	0.0	1.2	3.7	8.6	16.0	17.9	27.0	15.4	9.8	38,772
9	0.0	0.6	1.9	2.5	3.7	4.3	14.2	23.3	32.1	17.8	48,950
10	0.0	1.2	0.0	0.0	0.0	2.5	2.5	9.8	26.5	57.7	-
Current Consumption Decile Cut-Offs	7,763	10,691.1	13,285.6	15,612	18,074.4	20,607.1	23,612.4	27,934.7	34,703.8		

1989 Consumption Decile

Income Decile	1	2	3	4	5	6	7	8	9	10	Income Decile Cut-Offs
1	63.8	19.6	6.6	4.6	2.0	0.7	1.3	0.0	1.3	0.0	8,603
2	24.3	30.7	21.1	11.8	4.6	3.3	2.0	1.3	1.3	0.0	12,655
3	7.2	26.1	23.7	18.3	7.2	8.6	5.9	2.0	0.0	0.7	17,387
4	2.0	11.8	22.4	17.7	19.6	11.2	7.8	4.6	3.3	0.0	22,500
5	1.3	7.8	12.5	19.6	21.6	11.2	13.7	5.3	5.2	2.0	28,400
6	0.7	0.7	7.2	19.0	12.4	22.4	20.3	11.2	5.2	0.7	35,392
7	0.7	1.3	4.0	3.3	20.9	21.7	15.7	16.5	11.1	5.2	41,763
8	0.0	1.3	1.3	2.6	7.8	11.8	17.7	27.6	19.0	10.5	50,500
9	0.0	0.7	1.3	2.0	3.9	7.2	12.4	21.7	33.3	17.7	65,750
10	0.0	0.0	0.0	1.3	0.0	2.0	3.3	9.9	20.3	63.4	-
Current Consumption Decile Cut-Offs	10,158	13,634.4	17,013.1	20,147.5	23,034.7	26,568.9	30,784.6	35,828.9	45,174.1		

Source: Author's Calculations from the CES. There are 1630 observations for 1984 and 1526 for 1989. Entries are percentages which add to 100 within rows.

Table 2. General Sales Tax Rates

	Rural	Northeast	South	Midwest	West
General	4.54	5.11	4.66	4.11	4.41
	4.84	5.12	4.83	4.86	4.49
Food	0.71	0.00	0.50	1.62	0.38
	0.85	0.00	0.60	2.17	0.32
Utilities	0.91	0.00	2.43	0.69	0.48
	1.67	0.00	2.46	1.41	1.13
Prescription	0.00	0.00	0.00	0.00	0.00
Drugs	0.00	0.00	0.00	0.00	0.00
Clothing	3.74	2.14	4.22	4.11	4.41
	3.88	1.57	4.38	4.86	4.49
Personal	1.14	2.00	0.88	0.95	0.74
Care	1.39	1.99	1.88	1.04	0.76

Sales tax rates are weighted averages of state rates for each
commodity group weighted by aggregate income for the states within
each region. The top number in each cell is the 1984 rate and the
bottom number the 1989 rate. Source: author's calculations.

Table 3. Predicting State Sales Tax Deductions in 1984

Region	Rural	NE	S	MW	W
AGI Percentile*					
10 - 25%	101.91	238.37	124.94	-30.86	100.79
	(83.14)	(278.61)	(134.81)	(116.73)	(194.72)
25 - 50%	217.16	388.11	101.96	230.00	168.52
	(98.65)	(304.03)	(156.66)	(154.07)	(205.44)
50 - 75%	635.38	924.12	204.66	855.60	564.63
	(224.98)	(565.71)	(352.56)	(420.53)	(358.69)
75 - 90%	1029.03	1497.90	314.24	1461.65	833.18
	(363.24)	(879.40)	(552.39)	(691.24)	564.57
90 - 95%	1267.89	1894.20	463.52	1685.95	1082.15
	(409.07)	(1010.22)	(589.13)	(796.69)	(629.49)
95 - 100%	1477.56	2040.06	618.67	1977.12	1323.53
	(429.27)	(1017.89)	(637.40)	(857.49)	(649.21)
Family Size	51.87	58.88	8.04	72.48	46.94
	(13.41)	(29.41)	(23.15)	(16.08)	(30.17)
Elderly*	22.98	7.05	8.40	121.99	-22.02
	(28.31)	63.64	(45.12)	(72.39)	(55.92)
Inverse Mills	1847.28	2885.69	-270.25	3311.30	1365.84
	(931.22)	(2135.54)	(1375.42)	(1850.18)	(1430.02)
Intercept	-1339.04	-2203.96	301.07	-2491.70	-887.65
	(748.12)	(1729.31)	(1101.84)	(1477.13)	(1161.60)
R^2	0.174	0.153	0.216	0.217	0.166
Number of Observations	3598	806	939	1078	775
% of Correct, Predictions First Stage	80%	80%	80%	80%	80%

The dependent variable is the sales tax deduction reported on tax returns in 1984. These regressions are run on all observations with positive deductions. The inverse mills ratio comes from a first stage probit regression with the same explanatory variables. Standard errors are reported in parentheses. An asterisk signifies a dummy variable.

36

Table 4. General Sales Tax As a Fraction
of Income and Consumption

| | | 1984 | | 1989 | |
Base	Income	Consumption	Income	Consumption
Decile				
1	1.97	0.82	1.90	1.03
2	1.32	0.94	1.76	1.34
3	1.27	1.00	1.70	1.37
4	1.00	1.06	1.50	1.44
5	1.06	1.15	1.33	1.63
6	1.19	1.30	1.25	1.57
7	0.99	1.31	1.17	1.59
8	0.89	1.14	1.29	1.75
9	0.86	1.14	1.10	1.61
10	0.74	1.31	1.07	1.74

Source: Author's calculations from the CES.   There are 1,625 observations
for 1984 and 1,526 for 1989.

Table 5. The Role of Eliminating Deductibility for General Sales Taxes

Income Base
Change in Average Tax Burden

Decile	Total	Eliminating Deductibility in 1984	1984 to 1989
1	-0.07	0.00	-0.07
2	0.44	0.00	0.44
3	0.43	0.00	0.43
4	0.50	0.00	0.50
5	0.27	0.00	0.27
6	0.06	0.01	0.05
7	0.18	0.06	0.12
8	0.40	0.13	0.27
9	0.24	0.12	0.12
10	0.33	0.14	0.19

Expenditure Base
Change in Average Tax Burden

Decile	Total	Eliminating Deductibility in 1984	1984 to 1989
1	0.21	0.00	0.21
2	0.40	0.00	0.40
3	0.37	0.01	0.36
4	0.38	0.03	0.35
5	0.48	0.03	0.45
6	0.27	0.08	0.19
7	0.28	0.07	0.21
8	0.61	0.14	0.47
9	0.47	0.18	0.29
10	0.43	0.17	0.26

Source: Author's calculations from the CES.

Table 6. Income Tax As a Fraction
of Income and Consumption
Dropping Negative Tax Liabilities

Base Decile	1984		1989	
	Income	Consumption	Income	Consumption
1	0.27	0.54	0.11	0.66
2	0.61	1.87	0.74	1.24
3	0.68	2.15	0.86	2.30
4	1.65	1.98	1.69	1.96
5	1.45	3.01	1.47	2.84
6	2.42	2.61	2.48	2.62
7	2.30	2.94	2.38	2.77
8	2.36	2.98	2.06	3.15
9	2.33	3.27	2.23	2.63
10	2.54	2.92	1.82	2.54

Source: Author's calculations from the CES.

Table 7. Income Tax As a Fraction
of Income and Consumption
Setting Negative Taxes to Zero

Base Decile	1984		1989	
	Income	Consumption	Income	Consumption
1	0.24	0.57	0.16	0.57
2	0.58	1.59	0.67	1.18
3	0.65	1.93	0.83	2.06
4	1.41	1.78	1.33	1.79
5	1.28	2.70	1.23	2.35
6	2.15	2.39	2.17	2.09
7	2.03	2.59	2.03	2.10
8	2.08	2.67	1.80	2.92
9	2.10	2.88	1.89	2.42
10	2.39	2.68	1.66	2.25

Source: Author's calculation from the CES. There are 1,460 observations for 1984 and 1,445 for 1989.

Table 8. Predicting Property Taxes For Tenants in 1984

Region	Rural	NE	S	MW	W
No. of Rooms	226.80 (83.31)	304.67 (149.78)	142.79 (61.90)	-44.17 (55.51)	17.71 (40.54)
Very Small Lot	----	-17.28 (457.58)	-76.45 (224.70)	-101.17 (167.07)	177.87 (130.26)
Small Lot	176.57 (265.03)	385.71 (416.86)	-101.77 (191.54)	-136.78 (171.44)	430.65 (172.55)
Large Lot	573.40 (228.04)	----	----	-798.14 (447.24)	746.52 (409.75)
Tennis Court or Swimming Pool	----	-271.71 (589.07)	445.80 (628.91)	151.04 (392.98)	212.83 (240.18)
Central Air Conditioning	26.13 (260.65)	1452.63 (499.51)	94.59 (192.87)	234.17 (177.03)	365.87 (168.84)
Detached Home	-70.65 (308.38)	177.14 (649.78)	33.75 (293.01)	112.29 (288.54)	-760.77 (277.20)
Terrace/Patio	-265.70 (329.30)	-633.12 (535.38)	565.90 (209.03)	-291.70 (355.24)	347.86 (114.05)
Built in: 80s	586.65 (509.16)	----	-497.90 (611.44)	-559.02 (311.83)	1475.66 (526.54)
70s	432.78 (364.87)	----	-78.33 (376.56)	-52.11 (333.24)	-40.12 (264.05)
60s	1479.15 (399.48)	-390.67 (665.61)	-18.17 (525.64)	-93.70 (375.59)	572.28 (271.52)
50s	118.33 (229.19)	78.29 (499.75)	-82.92 (230.82)	-16.67 (182.19)	199.96 (196.80)
40s	320.94 (295.48)	-455.82 (777.04)	187.35 (252.11)	-68.87 (187.73)	-307.78 (174.71)
20-30s	361.22 (316.47)	212.73 (560.50)	93.93 (208.67)	-308.51 (312.06)	149.63 (156.87)
Low Income	-133.04 (169.92)	336.21 (834.43)	-20.15 (176.73)	-115.81 (165.35)	-298.60 (144.29)

Table 8. Continued

Region	Rural	NE·	S	MW	W
High Income	----	976.98 (1447.44)	----	648.79 (452.18)	18.45 (350.81)
Low Education	-685.03 (227.80)	313.28 (426.63)	-60.90 (335.61)	-157.71 (179.06)	-601.68 (232.08)
Some College	-255.28 (271.26)	703.75 (715.82)	226.82 (184.88)	896.37 (434.85)	-484.45 (169.17)
Post Graduate Work	-157.29 (379.90)	1132.67 (572.04)	170.38 (249.03)	956.86 (452.18)	-5.92 (149.38)
European Background	91.21 (190.19)	65.85 (369.01)	9.97 (168.53)	-51.33 (139.23)	-417.76 (188.76)
Inverse Mills	3945.52 (2480.09)	3342.20 (7610.530	-947.04 (4143.91)	-7696.04 (3953.85)	-7766.18 (2733.28)
Intercept	-2265.62 (1422.05)	-2667.38 (3035.40)	242.58 (1803.57)	4203.95 (1881.99)	4382.72 (1470.00)
Number of Observations	112	141	191	173	170
R^2	0.30	0.28	0.25	0.38	0.34
% of Correct Predictions in First Stage	84%	74%	76%	67%	72%

These regressions are for owner occupied housing with positive property taxes in 1984. The inverse mills ratio comes from a first stage probit with the same explanatory variables. Estimated coefficients are not reported in cases where the variables would perfectly predict in the first stage regression.

Table 9. Property Taxes as a Fraction
of Income and Consumption

Base Decile	1984		1989	
	Income	Consumption	Income	Consumption
1	1.41	2.17	0.61	3.99
2	2.57	3.93	3.21	2.79
3	3.90	5.13	3.93	3.20
4	3.53	2.69	3.81	4.11
5	3.80	4.31	3.64	3.07
6	2.37	2.83	2.85	2.98
7	2.83	2.66	2.59	3.19
8	2.17	2.55	2.30	3.25
9	2.34	3.25	1.75	3.07
10	1.67	2.92	1.99	3.26

Source: Author's calculations using the 1984 and 1989 CES. There are 1,584
observations used for 1984 and 1,492 for 1989.

Table 10. Suits Index

	1984		1989	
Base:	Income	Consumption	Income	Consumption
Sales Tax	-0.11	0.05	-0.07	0.05
Income Tax	0.11	0.08	0.06	0.05
Property Tax	-0.09	-0.04	-0.11	0.01
Tax System:	-0.02	0.02	-0.04	0.03

Effect of Eliminating Sales Tax Deductibility in 1984:

Tax System:	-0.01	0.02

Sales Tax Suits Index for Urban areas

New York-Philadelphia	-0.07	0.11	0.04	0.18
Chicago-Detroit	-0.23	-0.05	-0.07	0.02
Los Angeles	0.06	0.12	-	-
Combined	-0.10	0.04	-0.01	0.11

Effect of Eliminating Sales Tax Deductibility in 1984:

New York-Philadelphia	-0.03	0.13	-	-
Chicago-Detroit	-0.18	-0.02	-	-
Combined	-0.07	0.06	-	-

The income tax Suits index is computed dropping observations with negative
tax liabilities. See text for further discussion.

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