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## **How Do Tax Policies Affect Low Income Workers?**

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## **Introduction**

The study of the incidence of the U.S. tax system has a long and impressive history that has proceeded along many different complementary paths. Arnold Harberger (1962) laid the groundwork for distributing the burden of taxes. Beginning with the pioneering work of Joseph Pechman and Benjamin Okner (1974), scholars have explored the impact of a wide array of taxes on the distribution of income. Theoretical work has subsequently incorporated distributive objectives into optimal tax design (see Auerbach 1985). Other work has explored the direct and indirect impacts of various tax reform proposals and also identified the effects that different tax reforms have on the distribution of income across income classes (See Carasso and Steuerle 2003; Burman and Saleem 2004; Gale and Orzag 2004; and Devarajan, Fullerton, and Musgrave 1980).

While the existing literature presents interesting snapshots of the impact of the U.S. tax system on low-income individuals, these snapshots are difficult to assemble into a complete view, something that was last done exhaustively in Pechman (1985). While ample data exist documenting changes in federal tax policy over time, information on state and local taxes, especially sales and property taxes, is less abundant. However, studies of state taxes have been done recently by both the Institute on Taxation and Economic Policy (2003) and the Center on Budget and Policy Priorities (2004)

Income distribution issues are, in addition to being of academic interest, often a key factor in public policy debates. Proponents and opponents of a particular bill often emphasize the distributional characteristics of their proposal. For example, in the 2000 presidential election, George W. Bush presented evidence suggesting that his tax changes would significantly improve the welfare of low-income individuals. Others presented evidence to the contrary.

Inferences concerning distributional issues, of course, depend on the impact of specific bills on the entire income distribution. In this paper, we abstract from this, and focus our attention on low-income individuals. Specifically, we attempt to gather data on every tax payment made by typical families to government at all levels in the U.S. for the longest period that data will allow. We collect these observations into an aggregate payment—including sales, excise, income, property taxes, and even at times the lottery—and explore the movements of this aggregate variable over time.<sup>1</sup> We document movements both in marginal and in average tax rates and payments over time.

To foreshadow our conclusions, we find that total direct taxes paid by low-income families have declined significantly, dropping especially sharply since the late 1990s. This overall result reflects a number of different factors. Federal income taxes have declined sharply for families because of the refundable child tax credit (instituted in 2001 for taxpayers with less than three children), expansions of the Earned Income Credit (EIC), and lower marginal tax rates. At the same time, state sales taxes paid have increased significantly, but not enough to offset the decline in federal taxes paid. Payroll taxes and property taxes stayed relatively constant throughout the last several decades.

Together, these results lead to our second finding. Non-income taxes as a percentage of total taxes for low-income families has increased sharply over time. One possible explanation for this pattern may be that issues of fairness appear to have put significant downward political pressure on tax liabilities for low-income families for taxes whose incidence is readily observable, but not for taxes, such as sales taxes, with less obvious distributional effects. Another explanation is that states, which levy most of the non-income taxes, tend to be less redistributive than the federal government. Finally, while overall taxes paid have declined notably, the phase-out range of the EIC applies

relatively high marginal tax rates to low-income families. Accordingly, while average tax rates have declined, marginal tax rates have, in some income ranges, done the opposite.

The next section outlines the methods we use to identify the movement of tax payments over time. Section III presents our results. Section IV concludes.

## **II. Methods and Data**

This paper focuses primarily on direct cash-flow measures of tax incidence. The actual incidence of any tax may differ from the incidence implied by direct payments. Numerous studies in public finance have modeled the incidence of many different taxes (for example, Fullerton, Shoven and Whalley 1978). Such detailed analysis requires elaborate models and detailed estimates of elasticities and is beyond the scope of this paper. Our objective is to exhaustively collect information on every tax payment that is made by typical low-income families and aggregate these into a single measure of taxes paid. We do not believe that these measures are accurate measures of the ultimate incidence of these taxes, although Devarajan, Fullerton, and Musgrave (1980) find evidence supportive of the view that exercises such as these provide a reasonable estimate of the true underlying incidence of many taxes.

### **Sample families**

We perform our analysis for selected hypothetical low-income families. These include a single mother with two children; a married couple with two children; and an unmarried adult with no children. We assume that the single mother earns \$7.00 per hour and, working full time, earns \$14,000 per year, that the husband of the married couple works full time at a wage of \$8.50 per hour, earning an annual income of \$17,000. We further assume that the wife earns \$5.15 per hour, the federal minimum wage since 1997,

and makes \$10,300 annually. The unmarried adult, like the husband of the married couple, has a wage rate of \$8.50 per hour and makes \$17,000 per year. All of these incomes are in 2004 dollars and are deflated using the personal consumption expenditures index from the National Income and Product Accounts for earlier years.

### **Marginal Federal and State Income tax rates**

We estimate marginal and average federal and state income taxes for our hypothetical families. We perform the marginal income tax rate calculations using software we developed which adds \$50 to the income of a representative individual and estimates the change in tax payment associated with that increase. The marginal tax rate calculations incorporate the negative marginal tax rate in the phase-in range of the EIC, the positive marginal tax rate in its phase-out range and other tax variables. We then construct a “skyline” chart for the income ranges relevant for this study, for each year from 1979 to 2004. In order to economize on space, we report complete skylines for 1980 and 2004.<sup>2</sup>

We also construct measures of taxes paid for these families over time. We use two complementary approaches. First, we use the National Bureau of Economic Research Tax Simulation Model (TAXSIM) to estimate the tax liability for a hypothetical family for each year from 1979 to 2004. Second, we construct an alternative measure of average tax paid from the Internal Revenue Service’s Statistics of Income (SOI). We could not gather state income tax data from the SOI because most low-income families do not itemize deductions, and hence do not report state income taxes on their federal returns. However, we can estimate the state income tax that they likely paid from the TAXSIM calculator.

### **Sales Taxes**

A major contribution of this paper is the incorporation of state sales taxes and state and local property taxes into the overall analysis of taxes paid by low-income families. Because our estimates required a number of difficult judgments, and have little precedent to draw on, we outline our methodology in some detail.

We construct marginal sales tax rates for each year from 1979 until the present and apply them to estimates of consumption of taxable expenditures for low-income families. Average state sales tax rates at the national level were calculated for general sales, food, clothing, services, prescription drugs, medical services, and utilities by taking the average of the 51 state (including the District of Columbia) sales tax rates weighted by state population.<sup>3</sup> Data for state tax rates and exemptions were gathered from the World Tax Database of the University of Michigan's Office of Tax Policy Research, Commerce Clearing House *State Tax Reporters*, and state revenue departments.<sup>4</sup>

Finding historical local sales tax rates was difficult because local jurisdictions with taxing authority number in the thousands. Therefore, instead of trying to find the sales tax rates of each locality over the last 25 years, we estimated local tax rates using data from the Governments Division of the U.S. Census Bureau, following the methodology of Maag and Rogers (2000).

The Census Bureau has gathered information on the total amount of tax receipts collected by the state government and local governments in each state and in the U.S. as a whole by year. For sales and use taxes, receipts are broken down into general sales taxes, utilities taxes, motor fuels taxes, and other specific goods and services sales taxes. To calculate the average local sales tax rate on general sales, food, clothing, services, medical services, and prescription drugs, we found the ratio of each state's local sales tax receipts to state sales tax receipts and increased the state tax rate by that amount.<sup>5</sup> Local

tax receipt data were missing for 2001, 2003, and 2004, and so we applied the previous year's percentage for those three years.

Because many states exempt utilities from taxation and yet contain local jurisdictions that tax them, we could not use this approach to calculate local utilities tax rates by state. Instead, we took the ratio of local utility taxes to state taxes for the entire United States and increased the average state utility tax rate by that amount. As our ultimate goal is a nationwide average sales tax for the relevant measure of expenditure, this step should not significantly affect the accuracy of our results.

We then applied all these sales tax rates to each expenditure category for each household in the Consumer Expenditure Survey (CEX). To form our CEX dataset, we used the "Consumer Expenditure Survey Family Level Extracts" available at the NBER website, which has data on annual expenditures for consumer units beginning with the survey of the first quarter of 1980 and ending in the second quarter of 1998. Since these extracts are divided into separate datasets for each quarter where families began the survey, we combined the datasets with families beginning the survey of the first and second quarter of one year with the third and fourth quarter datasets of the previous year to form each year's dataset. One drawback to using these data is that they end in 1998. Extending the NBER's CEX database beyond that time frame was beyond the scope of this paper. By relating our CEX-based results to aggregates that are available after 1998, however, we are able to impute measure of sales taxes made up to 2004. Imputed values are delineated in our tables and charts, and the method described in more detail below.

To calculate sales taxes paid for each of the three hypothetical families, we selected the sixty families headed by non-elderly adults with the same family size (1, 3, and 4 for the unmarried adult, single mother, and married couple, respectively) in each

year with income (as calculated below) nearest to the sample family's income – thirty with income above and thirty with income below.<sup>6</sup> For the single mother, we added her federal tax refund to her \$14,000 of real earnings, so her total income varies by year. The married couple and the unmarried adult have positive tax liabilities from 1980-1998 and therefore have no income adjustment. We then averaged the sales taxes owed by these sixty families to calculate sales taxes owed by the hypothetical families.<sup>7</sup>

Since households in the Consumer Expenditure Survey with low reported incomes may not actually be low-income due to underreporting of income, we used a different measure of household income than that reported in the CEX.<sup>8</sup> To estimate each household's income, we added its total outlays, taxes paid, and saving.

Total outlays includes current consumption (which includes sales and excise taxes), retirement and pension payments, charitable contributions, and alimony paid. It excludes the purchase price of financed vehicles and houses; instead, it includes principal payments and interest payments on vehicles and property.

Taxes paid include federal and state income taxes, owned housing and personal property taxes, and non-taxes (car registration fees, driver's license fees), except that negative tax liabilities are not included.

Saving includes the change in the value of savings accounts and checking accounts, the net value invested in a farm or business, and the change in the amount owed to creditors.

When matching sales tax data with the income tax data from other sources, we use this comprehensive income measure as income, rather than income as reported in the CEX.

To provide estimates for sales tax outside of the CEX sample period, we estimated values for 1979 and 1999-2004 by running a regression of sales taxes paid (calculated by

the method above) on sales tax receipts (from the National Income and Product Accounts tables) and the average sales tax rate. We used this regression to predict sales taxes for the missing years.

### **Gasoline Taxes**

We calculated gasoline taxes paid differently than regular sales taxes, since most of the taxes levied on gasoline are excise taxes.<sup>9</sup> Gasoline excise taxes are imposed by federal and state governments, and some states also levy additional sales taxes on gasoline. We found estimates of the average tax on gasoline in cents per gallon from the American Petroleum Institute (API), whose estimates include both federal and state excise and sales taxes for each year. API does not include local taxes, so we used the Census government finance data and the same methodology as with sales taxes to estimate average local tax rates.

Then, for each household, we estimated the number of gallons of gasoline purchased by dividing gasoline expenditures in the CEX by the average price of gas for each year, which we obtained from the American Automobile Association. We then applied the combined federal, state, and local tax rate to the number of gallons of gas purchased and predicted gas taxes paid for the missing years using the same regression method as above.

### **Property Tax**

Property tax is one of the most important taxes paid by some low-income families, but it is difficult to estimate since the sample sizes in the CEX for low-income families are relatively small.

We examined two types of property tax: housing property tax and personal property tax, both of which are items in the CEX. Since both of these taxes have

substantial variation among individual households, we found that the method applied to sales taxes resulted in unreasonably large swings from year to year.

We expect that the level of property taxes revealed in these numbers is an acceptable characterization of taxes paid by low-income individuals over time; we smoothed the data from year to year to avoid having variation in property taxes dominate the aggregate picture. For smoothing personal property tax, we used the same methodology as for sales tax above, but took a three-year moving average.

Housing property tax was significantly more volatile, since one or two low-income individuals with a substantial property could significantly affect the results in a given year. To calculate housing property tax, we took the average of property taxes owed by non-elderly households who owned property (i.e., had property taxes > 0) and had incomes within certain bands, regardless of household size. For married couples, we calculated the average property tax for households with incomes between \$20,000 and \$30,000. For the single mother and the unmarried adult, we took the average for households with incomes between \$10,000 and \$20,000. Then, to smooth property tax liability, we took the three-year moving average. These sample sizes were fairly large, and the constructed series less prone to being driven by outliers.

However, since most low-income families rent rather than own their homes, and some part of rent must go to pay the property taxes of the landlord, it was necessary to also calculate the value of property taxes indirectly paid by renters. We found the median property tax as a percent of rental receipts from the US Census Bureau's Residential Finance Surveys of 1981, 1991, and 2001. Since the median had decreased over time (from 11.9% in 1981 to 7.6% in 2001), we took a trend to estimate the percentage in each of the intervening years. We then multiplied this percentage by the average rent paid by

the hypothetical families (calculated using the sales tax methodology but selecting only families that paid rent) to find the total amount of rent that was due to property taxes.

After estimating the property tax burdens of owners and renters, we calculated the likelihoods of each of the hypothetical families owning or renting their homes. We found the average annual home ownership percentage for households with similar characteristics to our hypothetical families from the CEX. To smooth the homeownership percentage, we then regressed it on a constant and a trend for each family type. Assuming that those who do not own must be renters, we then took the average of the owned housing and rental housing property tax burdens, weighting by the homeownership percentage, in order to find the average housing property tax owed by our hypothetical families.

To find total property taxes, we took the sum of personal and housing property taxes. To predict property taxes for the years missing from the CEX dataset, we regressed property tax on a constant and a trend.

### **Lottery Expenditures**

Lottery expenditures represent a significant fraction of total expenditure for many low-income individuals (Clotfelter and Cook 1989; Clotfelter et al. 1999; Cornwell and Mustard 2001). Because the payout rates of lotteries are relatively low, some fraction of lottery expenditure is conceptually a tax. Moreover, since the lottery payout formulas tend to be highly skewed towards low-probability large payouts, most individuals likely spend more on tickets than they win. Accordingly, we endeavored to estimate net lottery payments for our hypothetical families, and include these in parts of our analysis.<sup>10</sup>

The CEX includes a question concerning expenditures on gambling activity, but virtually every respondent either refused to answer the question or answered that they did

not gamble at all. Therefore, we turned to other sources to acquire a more realistic picture of lottery expenditures.

Survey data show that per capita lottery expenditures vary by household income. We used the following sources for data: Brinner and Clotfelter (1975), Suits (1977), Clotfelter and Cook (1987), Clotfelter et al. (1999), Cornwell and Mustard (2001), and Kearney (2002). For each of the six sources of data on lottery expenditures by income group, we computed the average per capita (or per household) lottery expenditures by income group, expressed as a multiple of the population average. We then applied these ratios to aggregate lottery expenditures, which we obtained from state lottery commissions.<sup>11</sup> For the families of the single mother and the unmarried adult, per capita and per household figures are equivalent, but for the married couple family, we multiplied per capita figures by two to obtain per household figures. Multiplying these average expenditure ratios by the average sales per capita, we determined the average annual lottery expenditures for the hypothetical families.

### **III. Results**

#### **III. A Skyline Charts of Marginal Income Tax Rates**

Figures 1 through 3 present marginal tax rates for our three hypothetical families in 1980 and 2004, when federal income taxes, the employee and employer share of FICA taxes, and food stamps and AFDC/TANF benefits (and their relevant phase outs) are included.<sup>12</sup>

For the married couple and the single mother, one the main factors affecting their federal income marginal tax rate in both years is the Earned Income Credit (EIC). It causes a negative marginal tax rate as it phases in from zero earnings to the level at which the credit reaches its maximum value, a 0 per cent rate after it reaches the maximum

value up to the phase out level, and then a positive rate as the credit phases out to zero. The phase-in rate for families changed from -10 per cent in 1980 to -40 per cent in 2004, leading to very low marginal tax rates at the lowest levels of income. Because the EITC is so small for individuals without children, it has little effect on their marginal tax rates.

However, the increase in the phase out rate from 12.5 per cent to 21 per cent and the increase in the income eligibility limits of the EIC have led to higher marginal tax rates at moderate income levels.<sup>13</sup> In addition, whereas the marginal federal income tax rates are negative for low incomes, payroll taxes and the phase out of benefits imposes a high enough rate to more than fully offset the low income tax rates. This is true over both years.

As the benefit reduction effect is so large, a bit more detail is in order. We assume that the single mother is eligible for both AFDC/TANF and food stamps. However, because AFDC/TANF recipients are overwhelmingly single mothers, we assume that married couples are eligible for only the food stamp program. Since AFDC/TANF and food stamp benefits decrease as earnings increase, these programs dramatically increase the marginal tax rate for the single mother, and the food stamp phase out increases the rate for the married couple as well. However, different welfare rules in different years caused the marginal tax rate to move around sharply. In 1980, the marginal tax rate for AFDC benefits was around 60 per cent. In 2004, the marginal tax rate of TANF benefit was reduced to 50 per cent, since half of earnings could be disregarded.<sup>14</sup> The calculation for food stamp benefits did not change much from 1980 to 2004, so they always added 24 percentage points to the marginal tax rate when they were received without welfare.<sup>15</sup> However, when welfare benefits were also being received, food stamps phased out more

slowly, although the exact phase out rate depended on the AFDC/TANF benefit calculation.

Notice that at \$10,000 of earnings, the total marginal rate for a married couple was 21 percent in 1980, but it had fallen to around 0 percent in 2004 because the negative rate of the EIC phase in had increased. However, at an income of \$25,000, the marginal tax rate has increased from 29 to 43 percent, primarily because the EIC is available at higher incomes in 2004, and so the family faces the high EIC phaseout.

There is a similar pattern for the single mother's skyline in Figure 2. At \$10,000, the total marginal tax rate falls from 62% in 1980 to about 0 percent in 2004. The drop is due to the increase in the EIC phase in rate and the decrease in real income eligibility limits for welfare; at \$10,000 of earnings in 2004 the single mother is not longer eligible for TANF, and so she does not face the high phaseout rate of welfare benefits that she does in 1980. At \$25,000 of income, the direction of change in the marginal rate is the opposite; the marginal rate in 1980 was 32% and increased to 43% in 2004 because of the increase in the income eligibility limits of the EIC and the higher phase out rate.

The unmarried adult (Figure 3) has very different marginal tax rates than the married couple and single mother. In 1980, the unmarried adult is not eligible for the EIC because he has no children, so his federal income marginal tax rates are driven only by the standard deduction, his personal exemption, and his tax brackets. In 2004, he was able to receive the EIC, although the phase-in and phase out rates are much lower than for taxpayers with children and have much less impact on marginal tax rates. The EIC rate for people without children was set at -7.65 per cent, so that it offsets the employee portion payroll tax at the lowest levels on income, but it does not offset the employer's share.

The unmarried adult never qualifies for welfare since he does not have children who are listed as dependents, and he also is not eligible for food stamps in 2004. In 1980, at the lowest levels of income, food stamps have no effect because they remain at the maximum benefit level due to income deductions. As the food stamp benefit phases out, it adds 24 per cent to the marginal tax rate. Note that, mainly due to lack of the food stamp benefit phase out in 2004, marginal rates fell from 49% to 33% between 1980 and 2004 at \$10,000 of earnings. At \$25,000 of income, marginal rates in the two years were almost equal at around 30%, which was simply the unmarried adult's tax bracket plus FICA payments.

Summing up, marginal tax rates have varied enormously over time for low income individuals. At the lowest levels of income, marginal rates have decreased tremendously as the EIC phase in rate has become more negative. Also due to the EIC, families with children have seen their average tax rates decrease at low to moderate levels of income, but because the larger EIC requires a higher phase out rate, they face higher marginal rates as the EIC phases out.

### **III.B Income Taxes Paid**

We now discuss the movement over time in income taxes paid by low-income individuals. Figure 4, which we constructed from the IRS's Statistics of Income (SOI), shows the movement in the average federal income tax rate for filers (of all marital and filing statuses) with income of \$10,000, \$20,000 and \$30,000 for each year from 1979 to 2002. Each line shows a significant downtrend, with the average tax rate for filers with \$10,000 in income falling from about 2 per cent in 1979 to about negative 8 percent in 2002. This decline is primarily due to the introduction of the refundable child credit in 2001 and the expansion of the EIC in the early 1990s.<sup>16</sup> For filers at \$30,000, the average tax rate falls from about 10 percent in 1979 to about 5 percent in 2002.

The SOI data do not allow us to characterize the movement in taxes for our hypothetical families. For that, we rely upon the NBER TAXSIM calculator.

Figure 5 plots the tax bill in each year from 1979 to 2004 for a married couple with two children and an income of \$27,300 (in 2004 inflation-adjusted dollars). The chart indicates what the family's tax liability was under each year's tax law for federal income taxes, state income taxes, the employee and employer share of social security payroll taxes (FICA), and the sum of these three taxes. Because of the expansion of the EIC and the child credit, in particular, the downtrend that was evident in the early part of the sample accelerates by the end. In 1979 this family paid about \$5,236 in total income and payroll taxes; by 2004 its liability had fallen to \$1,208. State income taxes are very small across the years (\$230 in 2004), and FICA is \$4,176 (the rate has been 7.65 per cent each for employer and employee since 1990).

Figure 6 provides a similar chart for a family of three with a single parent earning \$14,000 in constant dollars. The tax system provides a net subsidy to work for this family, a subsidy that climbs sharply over time. By 2004, the net subsidy is \$2,613, an

impressive 19 per cent of total income (the \$4,622 federal income tax refund is offset by \$2,142 in FICA; state taxes are negative, but negligible).

Figure 7 tells a strikingly different story. It plots the income and payroll tax liability for a single adult. While the tax code has moved toward subsidizing work for low-income families with children, it has not changed in its treatment of unmarried individuals without children. The total tax liability for an unmarried adult with no children has declined only slightly, and is still positive, at about \$3,923 in 2004. The average tax rate is roughly the same as that paid by single individuals with incomes almost twice as high.

Thus, the federal and state income tax codes have, on net, moved toward work subsidies only for families with children. There is far less progressivity of the tax code for individuals without children than may be popularly perceived.

### **III.C Sales taxes paid**

As mentioned in Section II, a key innovation of our analysis is the focus on other taxes paid. Figure 8 summarizes in the aggregate what has happened to state sales taxes over time by plotting a weighted average of the state sales tax rates for each year. While statutory marginal income tax rates have declined over time, state sales tax rates have increased, climbing from just over 4 per cent in 1979 to 5.4 per cent in 2004.

Many states exclude numerous items from their state sales tax, and these exclusions have changed over time. To provide intuition for the figures that follow, Table 1 provides for each year of our CEX database the ratio of taxable consumption to total consumption. The table indicates that the consumption tax base has remained roughly constant over time, with no clear trend. Note how low taxable consumption is relative to total, beginning the sample at 38.22 percentage points, and ending the sample at 36.48

percentage points. Key excluded factors include rent, mortgage payments, most food purchases, and most services, depending on the state.

Because the fraction of taxable consumption is low and sales tax rates are about 5 percent, the importance of sales taxes in developing the overall picture will be lower than one might have expected.

Figure 9 plots our estimate of the evolution of sales and excise taxes for the three hypothetical families. As mentioned in Section II, we performed a separate calculation for the tax levied on gasoline, but we show the combined sales and gas taxes in the chart. For the family of four, indicated by the black line, the total sales tax (excluding gasoline taxes) was approximately \$411 in 1979, and this climbed to \$530 in 1998, the last year for which we have CEX data. Interestingly, the gasoline tax paid is fairly large relative to the total state sales tax, starting out at \$240 in 1979 and climbing to \$427 in 1998. The total sales and gas taxes owed by the family climbed from \$650 in 1979 to \$956 in 1998. The dotted extension of the total sales tax line indicates our estimate of the likely continued path of the sales tax to approximately \$1,050 in 2004.

The two gray lines provide the same data for our other two sample families. Both lines indicate upward sloping sales and excise taxes over time. Perhaps the most interesting pattern is the much sharper increase in sales tax paid for the single parent household with earnings of \$14,000. This increase clearly reflects the sharp increase in after-tax income (and hence, consumption) attributable to the refundable EIC and child credits received by the single mother. Despite her constant earnings, the single mother's income increases each year. In contrast, the unmarried adult -- who has a positive federal tax liability -- sees no increase in after-tax income and hence has a smaller increase in sales taxes paid.

Figure 10 provides our estimates of property tax paid for our three sample families. For each of them, our estimate of average property tax paid is about the same order of magnitude as our estimate of total sales and excise taxes paid. Our estimates in Figure 10 assume that the homeownership rate is 40-50% for the married couple, 11-16% for the single mother, and 24-30% for the unmarried adult, based on our calculations of the homeownership rate percentage in the CEX. For our family of four, which is much more likely to own a home or, if renting, to pay a higher rent, the average across all households of the property tax is about \$790 in 1979, and stays relatively constant over time. The property tax paid by the single mother is slightly more than half that paid by the family of four, and also stays roughly steady over time. The property tax paid by the average unmarried adult is slightly higher than that of the single mother.

Figure 11 indicates the evolution of lottery spending over time. As has been remarked upon elsewhere (Clotfelter et al. 1999), our estimates show a rapid uptrend in total lottery spending for low-income individuals. A typical family of four, for example, is estimated to spend about the same on the lottery as they do on all state sales taxes (excluding gas taxes), and they spend significantly more on the lottery than they do on gasoline taxes. While our estimates are imputations, they do suggest that the share of lottery “taxes” in total is likely to be very significant for low income individuals.

### **III.D Putting It All Together**

In this section, we aggregate the taxes paid calculations we have done for the various components into an estimate of the total taxes paid by each of our sample families.<sup>17</sup>

Figure 12 plots the total tax paid across all jurisdictions for each of sample families from 1979 to 2004. The bottom line in the chart is our estimate of tax paid for

the single mother with two children. These taxes paid actually increased from 1979 until 1986, peaking at \$3,435. Since that time, they have declined steadily. While the various state and local taxes still impose a burden on single mothers, the total burden across all levels of government drops to a net subsidy of about \$1,130 by 2004.

The family of four also sees its tax liability drop sharply at the end of the sample. However, for this family, the many taxes faced other than the income tax collect enough revenue that the net tax is positive, despite the large income tax net subsidy. The tax paid by the unmarried adult is remarkably constant over time at around \$5,500.

Figure 13 provides perspective on the changing relative importance of the various taxes over time. It charts the share of taxes other than income and payroll taxes in total taxes. Since the total tax paid by the single mother with two children is now negative, we omitted that line. For a married couple with two children, the share of nonincome taxes rises dramatically over time, beginning the sample at about 25 percent and climbing to more than 60 percent by the end of the sample. No such change is evident for the adult without children.

Thus, while concerns about redistribution have clearly motivated a dramatic change in the income tax, changes elsewhere in the code have not kept pace, and the tax system has not increased in progressivity as much as one would think if one focused solely on the income tax.

#### **IV. Conclusion**

It is important to caution the reader at this point that direct measures of taxes paid, as have been reported in the previous sections, may be poorly correlated with the actual incidence of the tax. Kotlikoff and Summers (1987) review the literature on tax

incidence, and find that it is often the case that taxes paid are a poor guide to the actual effect of the tax. Generally speaking, things that are elastically supplied or demanded will bear less of the final burden than things that are inelastically supplied. To the extent that labor supply is highly inelastic, it may be the case that workers, as implicitly assumed above, bear the brunt of the income taxes described here, but a fuller analysis would be required before one could draw firm conclusions. Property taxes, especially to the extent that they are imposed on land, may be capitalized into prices, and ultimately born by whoever owned the property when it was first taxed.

In addition, this study has made no effort to attribute the corporate income tax to low-income individuals, although increasing tax competition over time may have led to this tax increasingly being born by workers. Suggestive evidence that this may be the case is provided by Lee and Gordon (2005) who find a strong negative relationship between corporate tax rates and economic growth, and also by Hassett and Moore (2005), who find a strong negative relationship between corporate tax rates and both labor income and poverty.

These factors suggest that there is ample room for future research. However, the data on taxes paid, limited as they are, support three principle findings:

- 1) Taxes paid by low-income individuals with children have declined over the last quarter century, even in the most comprehensive measure. Low-income individuals without children have seen little change in their overall tax burden over this period.
- 2) The proportion of taxes paid that is attributed to nonincome taxes has climbed sharply over time.
- 3) Marginal income tax rates have declined in very low income ranges, but have increased or stayed the same in moderate income ranges.



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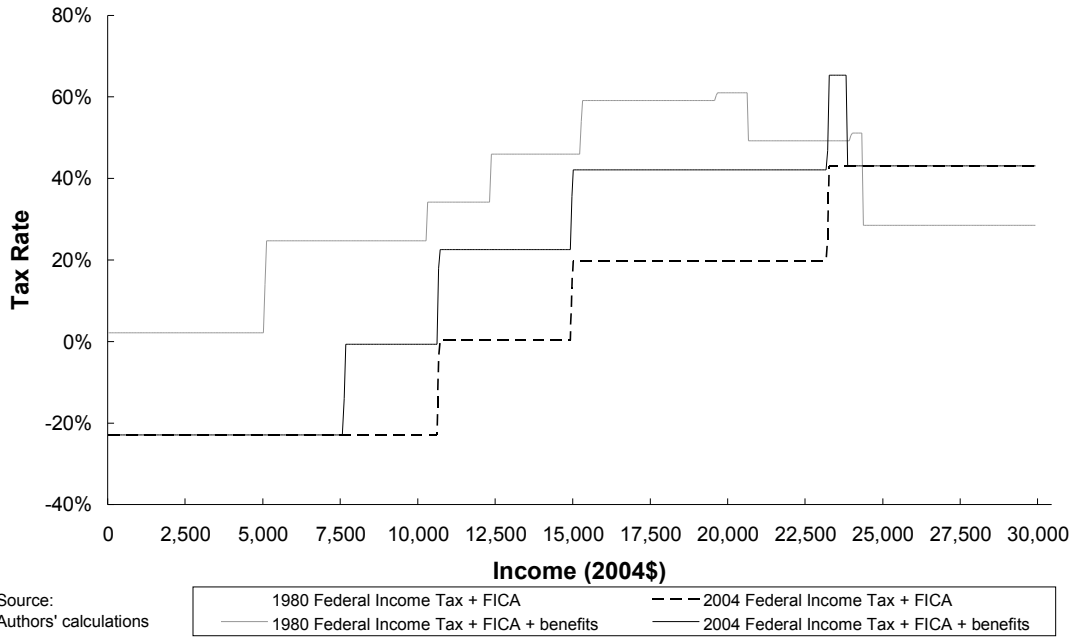
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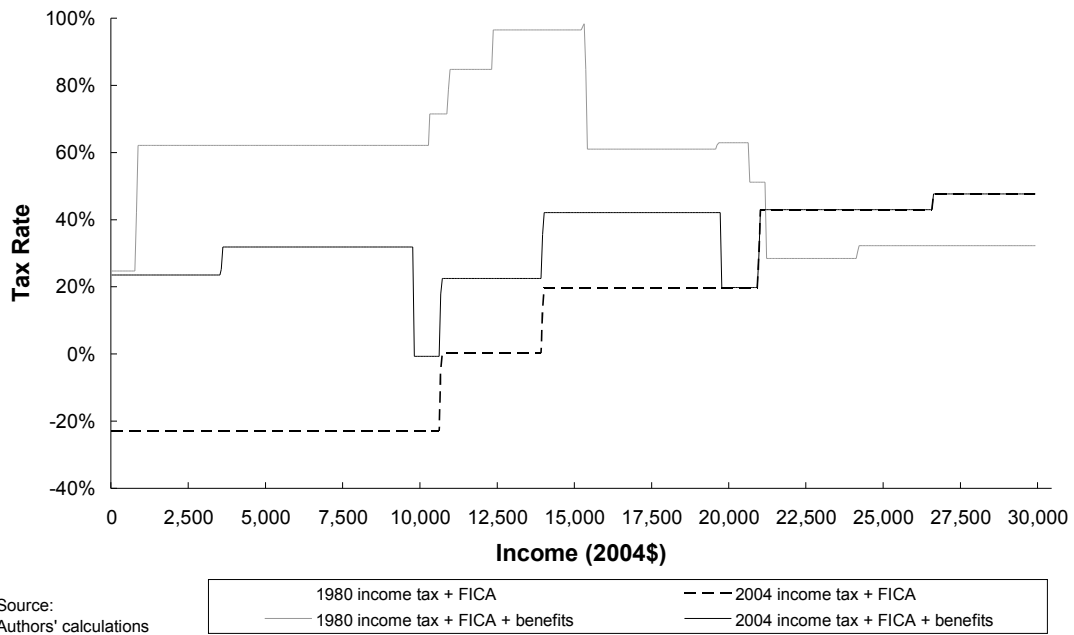
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<b>Table 1</b>	
<b>Year</b>	<b>Taxable Consumption/Total Consumption</b>
1980	38.22%
1981	38.18%
1982	38.27%
1983	38.01%
1984	38.55%
1985	39.94%
1986	38.61%
1987	37.95%
1988	40.45%
1989	40.22%
1990	39.56%
1991	39.03%
1992	37.76%
1993	37.36%
1994	37.12%
1995	36.60%
1996	36.31%
1997	36.62%
1998	36.48%

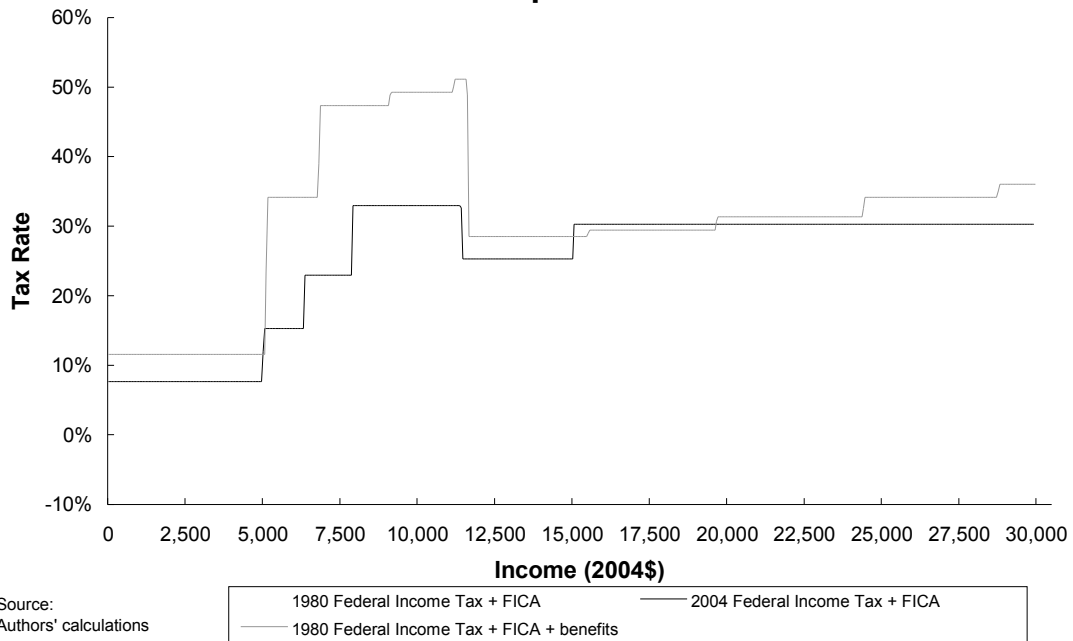
**Figure 1**  
**Marginal Tax Rate for Married Couple with Two Children**



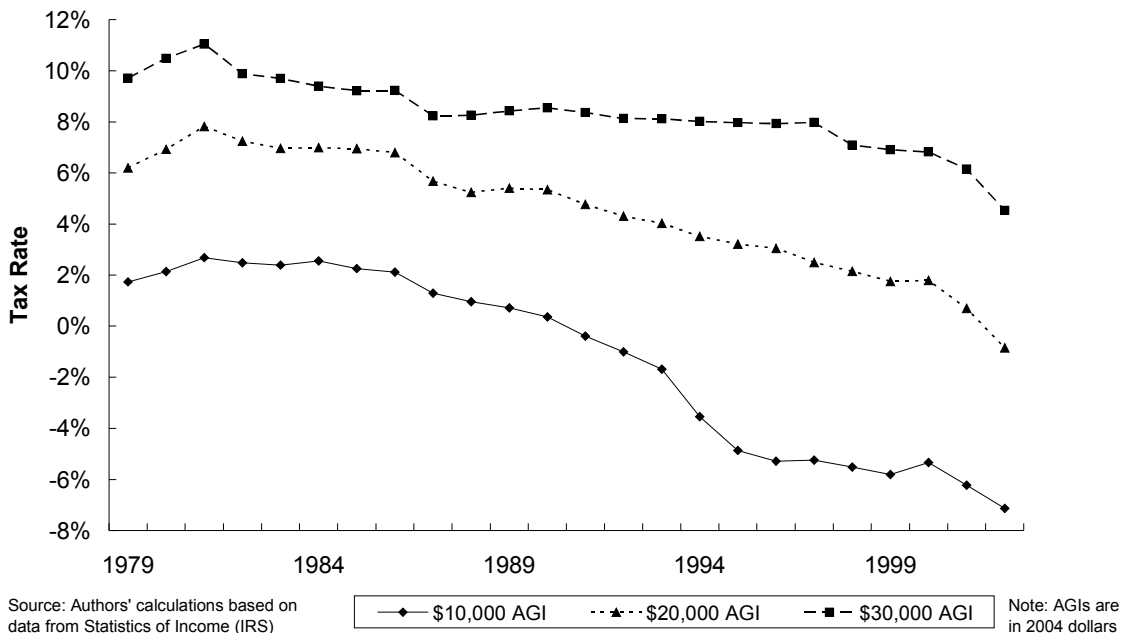
**Figure 2**  
**Marginal Tax Rate for Single Mother with Two Children**



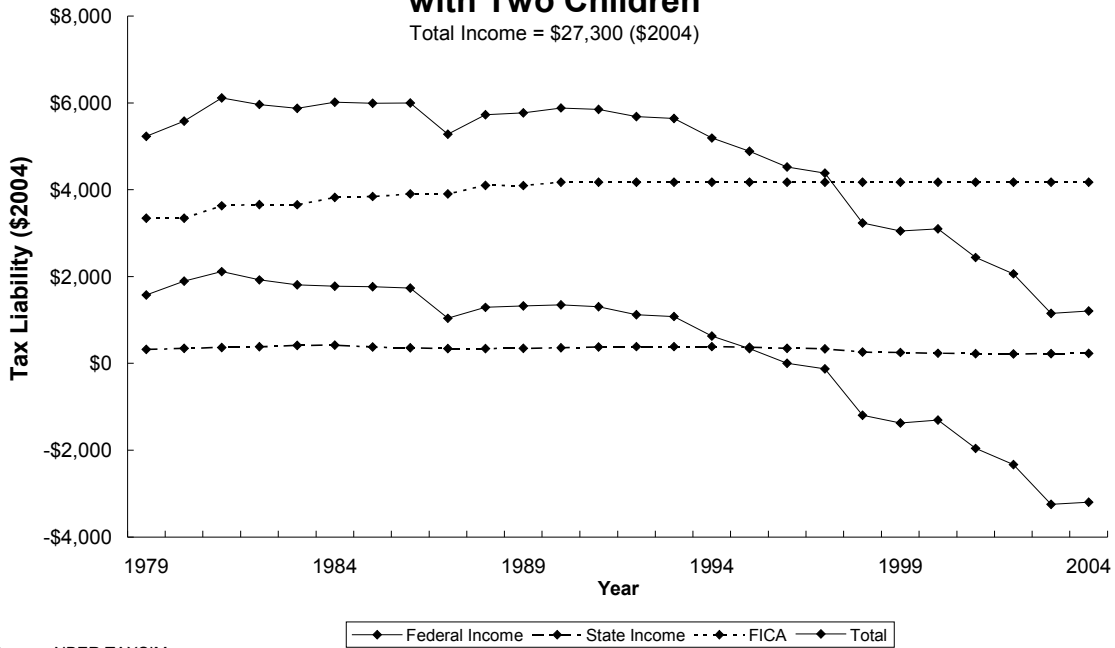
**Figure 3**  
**Marginal Tax Rate for Unmarried Adult with**  
**No Dependents**



**Figure 4**  
**Federal Income Tax (Including Refundable Credits) as a**  
**Percentage of AGI for Tax Filers, 1979-2002**



**Figure 5**  
**Income and Payroll Tax Liability for a Married Couple**  
**with Two Children**

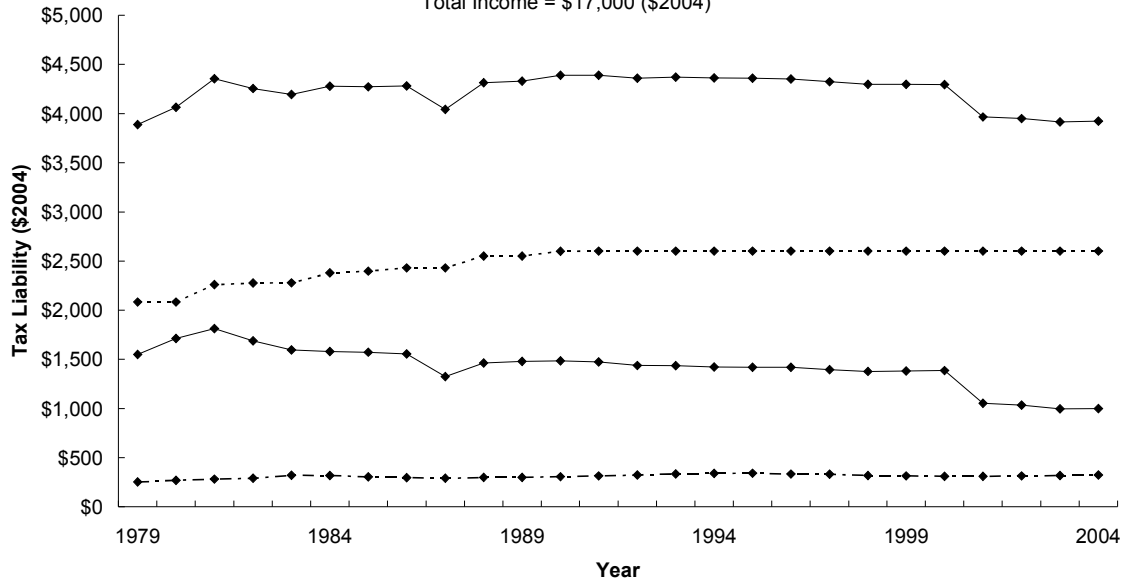


**Figure 6**  
**Income and Payroll Tax Liability for a Single Parent with**  
**Two Children**



**Figure 7**  
**Income and Payroll Tax Liability for an Unmarried Adult**  
**with No Dependents**

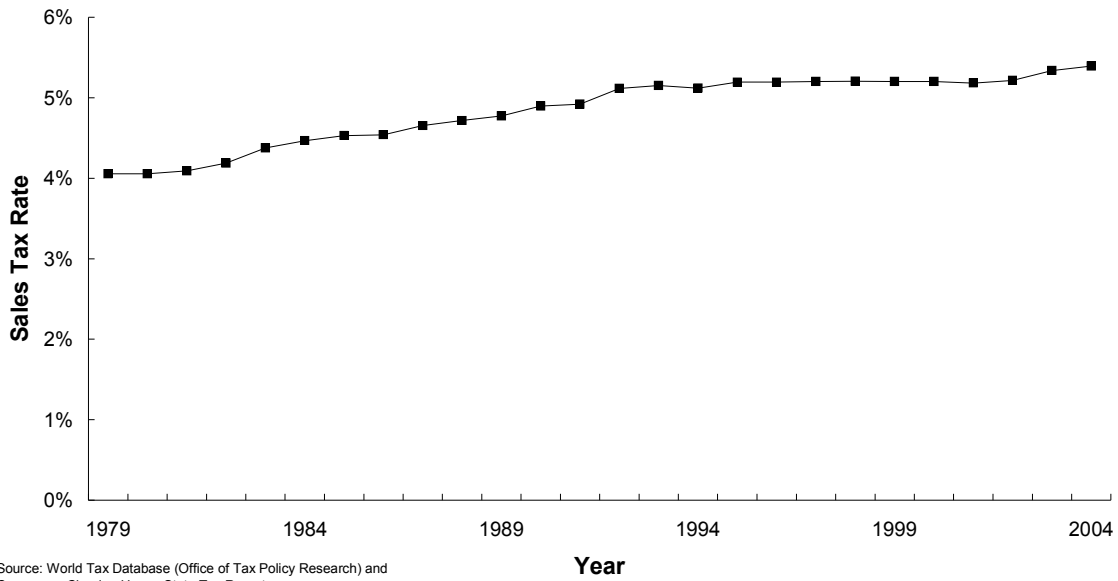
Total Income = \$17,000 (\$2004)



Source: NBER TAXSIM

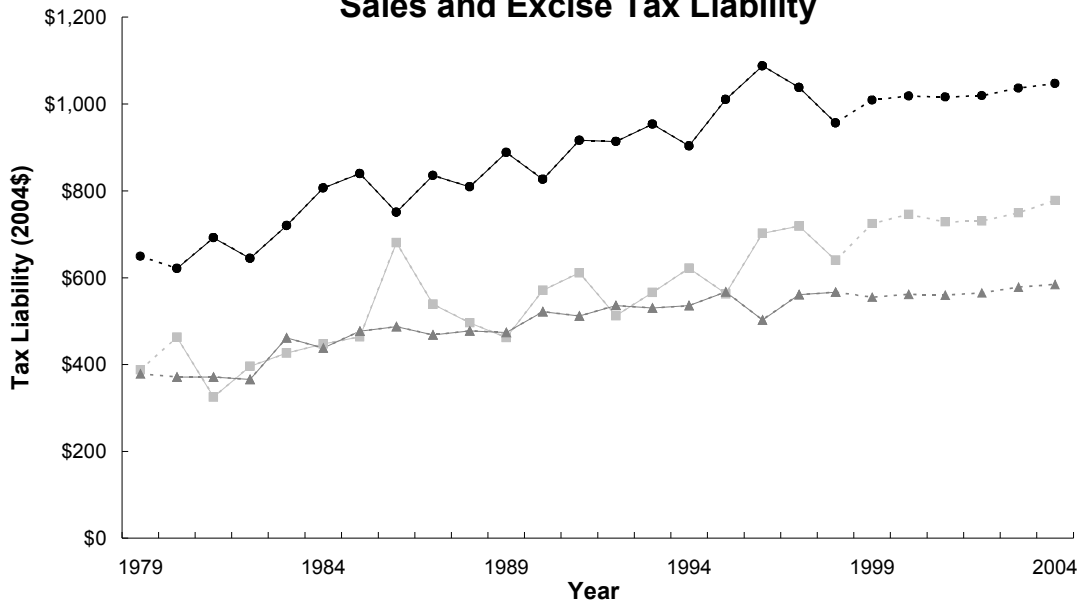
—◆— Federal Income    - - - State Income    ····· FICA    —◆— Total

**Figure 8**  
**Average State Sales Tax Rate**  
 (Weighted by State Population)



Source: World Tax Database (Office of Tax Policy Research) and Commerce Clearing House State Tax Reporters

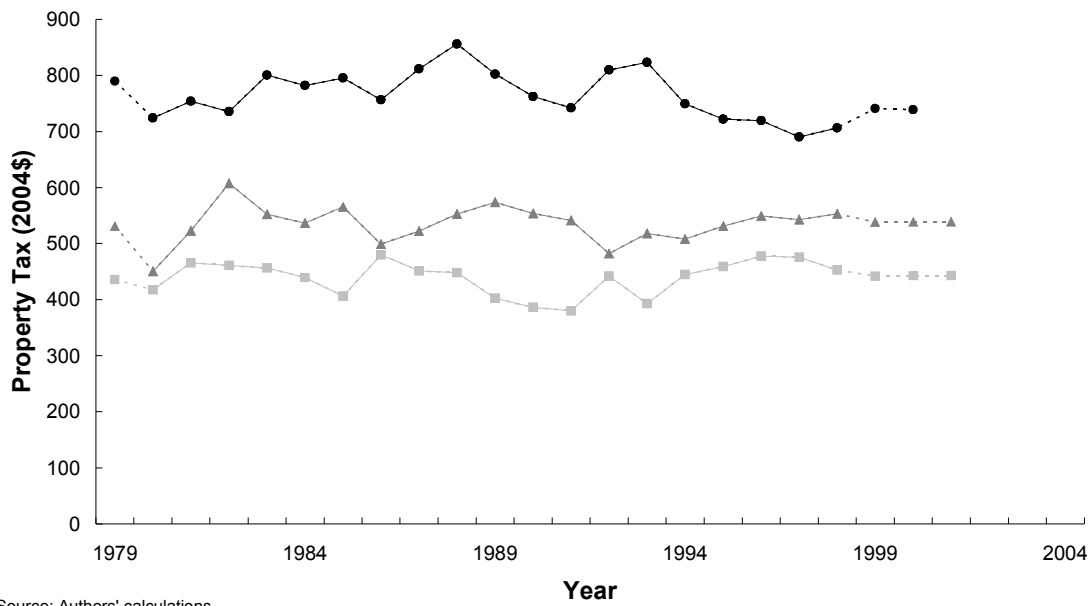
**Figure 9**  
**Sales and Excise Tax Liability**



Source: Authors' calculations based on data from CEX

● Married Couple    ■ Single Mother    ▲ Unmarried Adult

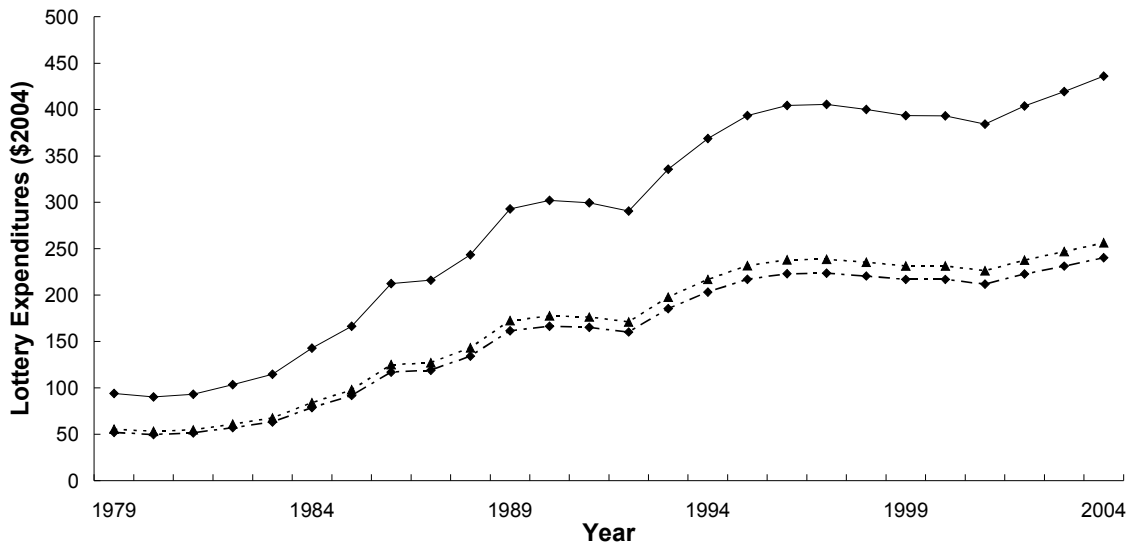
**Figure 10**  
**Property Tax**



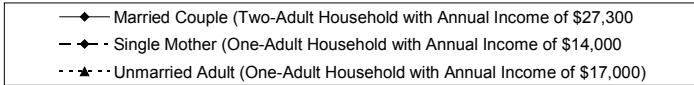
Source: Authors' calculations based on CEX data

● Married Couple    ■ Single Mother    ▲ Unmarried Adult

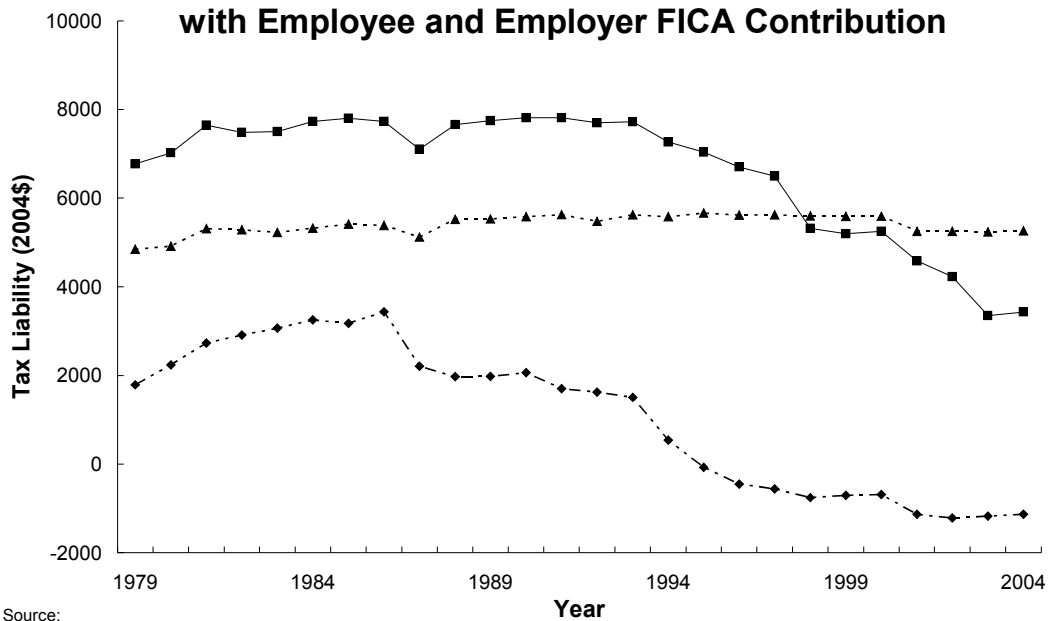
**Figure 11**  
**Lottery Expenditures (\$2004)**



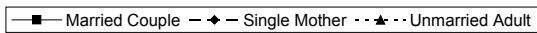
Authors' calculations based on data from state lottery commissions and published expenditure surveys



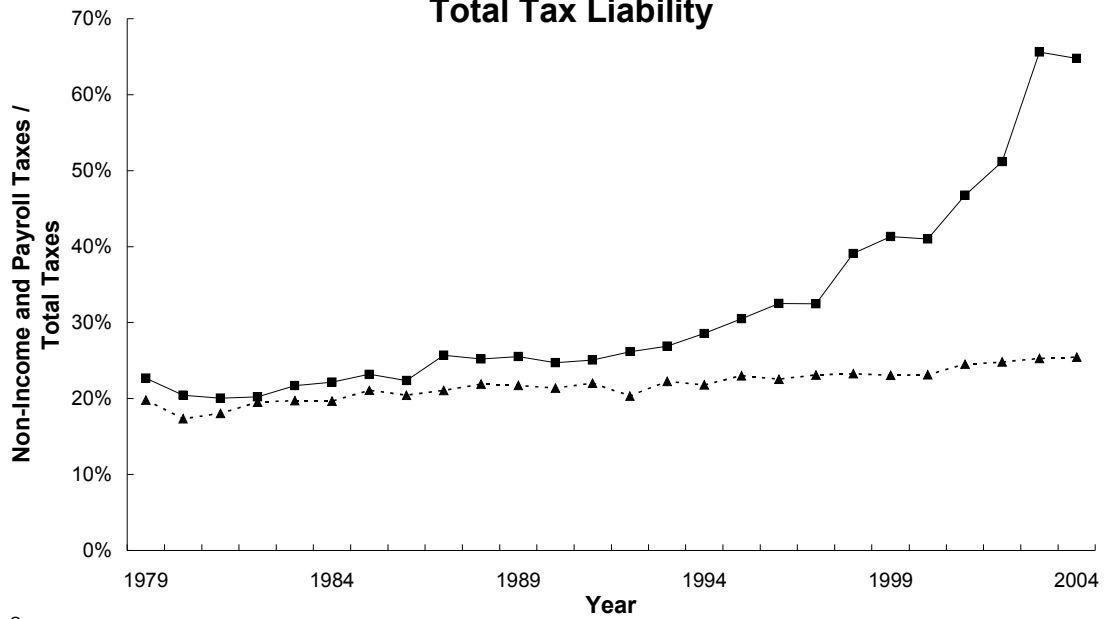
**Figure 12**  
**Total Tax Liability**  
**with Employee and Employer FICA Contribution**



Source:  
Authors' calculations



**Figure 13**  
**Non-Income and Payroll Tax Liability as a Percentage of**  
**Total Tax Liability**



Source: Authors' calculations

Married Couple with 2 children and income of \$27,300
 
 Unmarried Adult with income of \$17,000

<sup>1</sup> In work in progress, we will extend our analysis to individuals with higher incomes.

<sup>2</sup> The programs to calculate marginal tax rates are written in Excel, and are available from the authors on request. We will also provide individual year skylines on request for any year between 1979 and 2004.

<sup>3</sup>  
<sup>4</sup> Ring (1999) calculates similar nation-wide average sales tax rates using a comparable method, but he does so for only one year, 1989.

<sup>5</sup> Our state tax database is now the most complete and comprehensive of any we are aware of. Our data are available on request.

<sup>6</sup> This method assumes that local and state sales taxes have the same base, i.e. if the state exempts grocery purchases, then the locality does also. While this is not always the case, we believe it is mostly true and will not significantly affect our results.

<sup>7</sup> For the married couple and the single mother, there were not always thirty households of the correct family size with a lower income for each year, but the sample size was always greater than 40.

<sup>8</sup> We also checked that the distribution of income around our point of interest was approximately uniform, so that the mean was approximately the same as our point of interest. In each case, the mean and median were close.

<sup>9</sup> There is a large literature documenting the underreporting of income in the CEX. Our approach to this issue follows Rogers and Gray (1994) who outline the total outlays measure. Meyer and Sullivan (2003) and Poterba (1990) also discuss the merits of using consumption measures.

<sup>10</sup> Generally speaking, Americans refer to taxes on commodity units rather than on sales as excise taxes. This usage varies across countries, but is the one relied upon here.

<sup>11</sup> It should be noted that the lottery is one of the few taxes that people opt into paying and people gain utility from the fun of playing the game. Therefore, the tax burdens presented here are overstated to the extent that monetary losses are partially made up for by the lottery's entertainment value.

<sup>12</sup> Where possible, data on total lottery sales and net lottery revenues comes from state lottery commissions. We filled in missing data using FY1985 data from Clotfelter and Cook (1987), FY1989 data from Clotfelter and Cook (1990), FY1997 data from Clotfelter et al. (1999), and FY2002-2004 data from the North American Association of State and Provincial Lotteries (NASPL). We then used these data points to estimate any remaining missing data. The population figures are estimates from the U.S. Census Bureau of the national population aged 18 or older, since according to the NASPL, the legal minimum age for buying lottery tickets is 18 in almost every lottery state. Sales per capita are computed as total national lottery sales divided by the population aged 18 or older.

<sup>13</sup> AFDC/TANF benefits are based on the rules and standards of Pennsylvania, which has had average-size benefits over the last 25 years. AFDC/TANF benefits were calculated based on the rules for recipients who had been receiving benefits for more than a year rather than on the rules for applicants or for newer recipients.

<sup>14</sup> See Hotz and Scholz (2001) and Moffitt (2002) for discussions of how the EIC's impact on marginal tax rates might affect labor supply. Hotz and Scholz (2001) suggest that the EIC encourages participation in the work force, but that the effect on hours worked might be smaller than the marginal rates imply if recipients have an imperfect understanding of the credit structure.

<sup>15</sup> We are using the program rules in Pennsylvania as the representative state. In 2004, income disregards vary substantially by state.

This is lower than the 30 per cent that food stamps normally decrease by with each increase in income, since one-fifth of earned income is disregarded when calculating the food stamp benefit.

The refundable child credit was first introduced in 1998, but it was not available to filer with fewer than three children until 2001.

<sup>17</sup> There are a number of other taxes that we investigated but did not include in the final analysis because they were too small to affect our conclusions. For example, average cigarette taxes paid were relatively small given the large share of individuals that is made up of nonsmokers.