The Significance of Federal Taxes as Automatic Stabilizers

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April, 2000

We are grateful to Brad DeLong, Nada Eissa, Jonathan Gruber, Alan Krueger, Christina Romer, David Romer, Tim Taylor, Jim Ziliak, and participants in the NBER Public Economics program meeting for helpful discussions and comments on an earlier draft, and to Nancy Nicosia for research assistance. Auerbach received financial support for this research through the Burch Center for Tax Policy and Public Finance at Berkeley.

Abstract

Using the TAXSIM model for the period 1962-95, we consider the federal tax system's impact as an automatic stabilizer. Despite the many changes in the tax system, there has been relatively little change in its role as an automatic stabilizer. We estimate that individual federal taxes offset perhaps as much as 8 percent of initial shocks to GDP. We also suggest that the progressive income tax may help to stabilize output via its effect on the supply of labor, an additional effect that may even be of similar magnitude to the more traditional path of stabilization through aggregate demand.

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JEL No. E62

Automatic stabilizers are those elements of fiscal policy that tend to mitigate output fluctuations without any explicit government action. From the traditional Keynesian perspective, automatic stabilizers could include any components of the government budget that act to offset fluctuations in effective demand by reducing taxes and increasing government spending in recession, and doing the opposite in expansion. Perhaps the most commonly discussed automatic stabilizer is the federal income tax, which reduces the multiplier effects of demand shocks through the marginal taxation of income fluctuations. A progressive income tax with high marginal tax rates could substantially reduce fluctuations in after-tax income and, so the argument goes, private spending, without the need for any explicit policy changes. Moreover, automatic stabilizers avoid the slow implementation that can cause discretionary policy to lag so far behind events.

Since the period following World War II when automatic stabilizers were first discussed seriously, the U.S. tax system has experienced significant changes. The maximum marginal tax rate has declined substantially since the early 1960s. Over the same period, the payroll tax has grown steadily as a share of federal revenue, this growth offsetting relative declines in corporate and excise tax collections. Also changing over this period has been the distribution of income, with a marked increase in the share of income received by high-income taxpayers. In light of these and other changes, it is useful to consider what has happened to the tax system's potential to stabilize income fluctuations. While most of our analysis relates to the individual income and payroll taxes, we do offer some additional comments on other fiscal instruments at the end of the paper.

Our analysis reveals a number of interesting findings. We estimate that automatic stabilizer effects through the income and payroll tax together would currently offset about 8 percent of any initial shock to GDP. This impact is much the same as its was during the early 1960s (although it did increase temporarily during the late 1970s and early 1980s). Moreover, we believe that the

effects of changes in marginal tax rates on labor supply, although they are not often considered as automatic stabilizers, may be as important in this regard as the aggregate demand impacts normally considered.

What Makes Automatic Stabilizers Effective?

Automatic stabilizers must be precipitated by a shock that causes aggregate economic activity to fall or rise. How can fiscal policy act automatically to offset this shock? If fiscal policy is to stimulate aggregate demand without doing so directly through government purchases, it must provide inducements to increased private purchases. The inducement normally considered is an increase in disposable income, although there might be other changes to encourage current spending via incentive effects.

But the effectiveness of an automatic stabilizer depends not only on how much of an increase in disposable income it produces, but also how large a private response in consumption this increase in disposable income generates. This response, in turn, will depend on how the increase in disposable income is distributed, for households with different income levels will differ in the extent to which they spend increases in current disposable income.

In our analysis below, we follow this logic and address the measurement of automatic stabilizers in two steps, using individual tax return information from 1962 to 1995. The first step is to estimate how the sensitivity of after-tax income to before-tax income has changed over time. Presumably, reducing this sensitivity provides greater stabilization, since either increases or declines in before-tax income would have a lesser effect on after-tax income. Our approach decomposes measured historical variation into what is attributable, respectively, to changes in the tax system and to changes in the distribution of income. We also consider separately the role of the payroll tax and the Earned Income Tax Credit (EITC), a major redistributive component of the federal income tax

not present during the early years of the sample. Finally, we account for the additional changes in real tax liabilities induced by fluctuations in the inflation rate that are associated with real income shocks.

The second step of our analysis is to translate these reductions in income fluctuations into reductions in aggregate demand. Here, a crucial consideration is the extent to which consumption reacts to current disposable income. Since upper-income households are less to consume a smaller share of temporary additions to income, their change in consumption as a share of the change disposable income will be less than for middle-income and lower-income households. However, even though poor households might respond significantly to changes in tax payments, they pay a very small share of the income tax to begin with, and hence tax fluctuations will have little effect on their consumption. But the EITC and, especially, the payroll tax, are significant among lower income households, and hence may have a greater stabilizing impact. Thus, from the perspective of automatic stabilization, the growth in these two programs may have been an important change.

Data and Methodology

In the past, researchers have used a variety of techniques to estimate the responsiveness of the tax system to fluctuations in income.[1] One approach focuses on estimating an aggregate relationship between total taxes and total income. This approach does pick up the effects of changes in the composition of income that occur as aggregate income fluctuates, but its usefulness depends on the ability to hold other factors constant, and cannot deal effectively with changes in the tax law over time.

The approach we use is an extension of that developed by Pechman (1973, 1987), using a simulation model based on a file of actual tax returns to consider the impact of hypothetical changes in income and its components on individual tax payments.[2]

Our basic data are the individual tax returns covered by the NBER TAXSIM Model, which includes a "tax calculator" that allows us to estimate the impact on tax liability of changes in tax-return components of income and deductions.[3] The TAXSIM Model now includes 1962, 1964, 1966, and each tax year thereafter through 1995. Because the definition of Adjusted Gross Income (AGI) changed periodically during this era, we measure before-tax income using a standardized AGI measure, which is actual AGI plus the excluded portion of capital gains, IRA, and Keogh deductions, plus the dividend exclusion and the adjustment for alimony.

The period 1962-95 incorporates a number of important legislative changes in the individual income tax. These include: the Revenue Act of 1964, which reduced the top marginal income rate from 91 percent to 70 percent; the Tax Reform Act of 1969, which introduced a ceiling of 50 percent on the marginal tax rate on "earned" income;[4] the Economic Recovery Tax Act of 1981, which reduced the top marginal rate on other income from 70 percent to 50 percent; the Tax Reform Act of 1986, which reduced the marginal rate on the highest incomes to 28 percent and the top marginal rate to 33 percent; and the Omnibus Budget Reconciliation Act of 1993 (OBRA93), which raised the marginal tax rate on high-income individuals to at least 39.6 percent, with other provisions placing most such individuals into higher effective brackets. The EITC, introduced as a small program in 1975, was expanded by the Tax Reform Act of 1986 and the Omnibus Budget Reconciliation Acts of 1990 and 1993.

Over this same period, the payroll tax rose in importance, as its rate and income ceiling both grew. Most of the returns in our sample do not include a direct measure of payroll taxes. For the returns of single individuals, it is relatively easy to estimate such taxes based on the reported levels of wage and salary and self-employment income. However, for joint returns, the actual payroll tax will depend on the breakdown of earnings between husband and wife, which we typically do not

observe, unless total earnings are below the income ceiling for one person and hence fully taxable. Thus, we must estimate payroll taxes by imputing the income of each spouse. We do have data on the breakdown of earnings between husband and wife for 1974. Thus, for the years 1960-1979, we look at each level of AGI and say that the division earnings between husbands and wives at that income level has the same distribution as in the 1974 data. For later years, we use the distributions from the nearest year of the Survey of Consumer Finances (available for 1983, 1989, 1992 and 1995).

Initial Results

In the public finance literature, perhaps the most familiar measure of the sensitivity of taxes to income changes is the elasticity of aggregate income taxes with respect to changes in aggregate income. A proportional income tax has an elasticity of 1.0, while progressive tax systems whose tax-income ratios increase with income have an elasticity greater than 1.0. This elasticity, then, serves as an indicator of the tax system's overall progressivity. It is also true that, for a *given* level of taxes, the higher the elasticity, the smaller will be the change in after-tax income that results from a given change in before-tax income.

However, for purposes of measuring the tax system's role as an automatic stabilizer, the income elasticity of taxes has a severe shortcoming: it is invariant with respect to whether the share of income taken as taxes is high or low. If taxes take a large share of the economy, they will be more able to act as an automatic stabilizer than if they take a smaller share. But if one knows that the elasticity of taxes with respect to income is, say, 1.5, this is no help at all in knowing whether the percentage change in taxes is being calculated on a large or a small tax base. Thus, a more direct measure of the potential stabilization effect of the tax system is the ratio of the change in taxes with respect to a change in before-tax income; that is, the ratio of the changes not expressed, as in

the case of the elasticity, in percentage terms. Pechman (1973) refers to this measure as the tax system's "built-in flexibility" and we refer to it as the normalized tax change.

Figure 1 presents four versions of the normalized tax change for each year in our sample period. To calculate each value, we carried out a hypothetical experiment in which we increase all income and income-related deduction items on each tax return by 1 percent, meant to simulate a 1-percent change in aggregate income spread neutrally across the population. Then, we add together all the individual tax changes and divide by the sum of assumed income changes for that year. The result is the ratio of the aggregate change in taxes to the aggregate change in income.

The first series of Figure 1 presents estimates of this ratio for the income tax, excluding the EITC. The basic income tax without the EITC has served to cushion between 18 and 28 percent of the fluctuations in before-tax income over the sample period. We might expect this ratio to have fallen during the 1960s and 1970s, with the general decline (at least until the 1990s) of top marginal tax rates. However, the two years in which the ratio is highest are 1980 and 1981. The explanation lies in the high inflation of the 1970s and early 1980s. For a tax system based on nominal income and deductions, i.e., not indexed to the price level, inflation raises the real value of taxes paid for any given level of real income, because the system is progressive with respect to *nominal* income; an individual with a given real income will appear "wealthier" and face a higher average tax burden. The U.S. tax system was effectively indexed only in 1985 when provisions that indexed rate brackets, personal exemptions and the standard deduction took effect.[5] On the other hand, a trend does appear beginning with the 1981 tax cut, as the ratio declines gradually into the early-1990s.

Of course, not all of the year-to-year changes in this first series are purely attributable to changes in the tax schedule (either directly or through price-level changes). The responsiveness of tax collections to real income will vary both with respect to the level of income and also with

respect to the distribution of income, which will affect what proportion of the population faces various marginal tax rates. Some of these fluctuations in the distribution of income may be associated with business cycle fluctuations; some of the change in distribution in recent decades will reflect a secular trend.

The second series in Figure 1 repeats the exercise of the first series, but holds the distribution of income constant at that of the 1980 tax year. We implement this hypothetical experiment by applying the tax law for each respective year to the 1980 sample, with incomes and income-related deductions adjusted to reflect the ratio of that year's aggregate adjusted gross income to the adjusted gross income for 1980. In the 1960s, the normalized tax change would have been lower had the 1980 income distribution prevailed, which indicates a greater share of income among those in higher brackets – a more unequal distribution – during these very early years of the sample. This pattern reverses by the mid-1970s, with the gap between the two series reaching relative peaks in 1978 and 1986, relatively early in the well-documented period of increasing income inequality that ensued. However, the trend in more recent years is weak, surprising perhaps in light of the underlying movement in the income distribution.

The third series in the figure is a reprise of the first, with varying income distribution, but now the EITC and payroll tax are added. Adding the EITC alone (not shown) has no effect until its 1975 enactment, and a very small effect for the remainder of the period, never adding more than 1 percentage point to the overall response for the aggregate taxpaying population considered in this figure. For the payroll tax, we consider only the employee portion, in keeping with our focus on the change in individual tax payments.[6] In principle, the change in the employer portion should also act as a cushion, but the impact would be more indirect, akin to that of other business tax payments, which we consider further below. The effect of the payroll tax over time incorporates two factors,

both of which increase its magnitude. First, the payroll tax has risen over time. Second, the rapidly rising payroll tax ceiling has made more taxpayers subject to the payroll tax on marginal income changes. Overall, the payroll tax increases the normalized tax change substantially, particularly in later years. By 1995, roughly one-sixth of the overall tax response is attributable to the payroll tax.

The final series shown in Figure 1 takes into account the indirect effects of inflation on tax payments. The existence of a short-run Phillips curve implies that a decline in the rate of economic activity, as represented by a rise in the unemployment rate, will be associated with a fall in the inflation rate. As discussed above, inflation raised the *real* value of taxes paid before 1985, so a reduction in the rate of inflation would have decreased this effect, adding to the stabilizing impact of the tax system. To incorporate this effect in our calculation, we assume that the same uniform 1-percent shock to real income induces a 0.5-percent shock to the price level, for a total increase in each individual's nominal income of 1.5 percent.[7] We calculate the change in deflated taxes for each taxpayer and then proceed as before in constructing the ratio of the aggregate tax change to the aggregate real income change.[8] The impact of this additional effect is, as expected, to raise the normalized tax response in the years prior to 1985.

Regardless of which of the figure's series one considers, 1981 stands as the year in which the individual tax system absorbed the highest share of marginal income changes. The payroll tax imparts an upward trend from the early 1980s on, while the lack of indexing raises values for the period prior to 1985. The overall picture is one of very little net change over the full period, as the effects of particular changes have tended to cancel each other out. The normalized tax change in 1995, .26, is the same as that of 1966 and between the values of 1962 and 1964.[9]

Table 1 provides further detail on these normalized tax changes, breaking them down by income quintile for selected years during the sample period. The table presents three panels to

illustrate the effects of different components of income and payroll taxes. In the lowest quintile, the income tax has played an insignificant cushioning role except around 1981, when bracket creep had had its strongest impact; by 1995, the payroll tax is more important for this group. Note that the EITC reduces the impact of taxation for this lowest quintile, but raises it for the second quintile and, in more recent years, the third quintile, where taxpayers in the phase-out range dominate those receiving additional subsidy. At the other end of the income distribution, the payroll tax plays virtually no role, for individuals in the top quintile are nearly all above the payroll tax ceiling.

The normalized tax change for the top quintile has dropped over time. The impact of the top marginal rate reductions of 1964, 1981 and 1986 are evident in comparisons between 1962 and 1967, and 1981 and 1988, respectively, outweighing the impact of bracket creep through 1981 and the marginal tax rate increases of 1993. On the other hand, because of the rising payroll tax and, in the second and third quintiles, the EITC, the normalized tax response has risen for the rest of the income distribution.

The Stabilizing Effect of the Tax System on Aggregate Demand

For output to be stabilized, it is necessary that the cushioning effect of taxes on changes in before-tax income translate into lower volatility of household expenditures on goods and services. The traditional analysis of automatic stabilizers presumes that such a change occurs. However, a high reaction of consumption to an increase in current disposable income is not consistent with rational, forward-looking behavior unless: a) the increase is expected to be long-lived; or b) the household faces a liquidity constraint that depresses current consumption below its desired level. As we are focusing on income shocks that are cyclical in nature, and hence of relatively short duration, we must rely primarily on liquidity constraints – or myopia – to translate the income shocks, and their mitigation, into consumption responses.[10]

Several papers have estimated the extent to which households respond to changes in fiscal variables. Wilcox (1990) finds that aggregate consumption does respond to the timing of tax payments. At the micro level, Shapiro and Slemrod (1995) find similar sensitivity in response to changes in income tax withholding rules introduced by President Bush in 1992. These rules should have had little impact on rational households not facing liquidity constraints, for they amounted to a very slight change in the timing of tax payments. However, using survey evidence, Shapiro and Slemrod find that 43 percent of households would spend most of the extra take-home pay. More recently, Parker (1999) and Souleles (1999) find similar responses to predictable changes in social security taxes and tax refunds, respectively. One cannot apply these results directly to the current question, though, because the distributions of social security taxes and even tax refunds (which are less common among those with higher income) are more concentrated among lower- and middle-income individuals than are tax payments on incremental income. There might be a much lower response among the high-income taxpayers who account for such a large share of incremental tax payments.

Whether the responsiveness of consumption to current disposable income is due to liquidity constraints or to other factors, there is little doubt that a substantial share of the population does respond to longer-range measures of wealth and income. Thus, the consumption response to the tax changes measured in Table 1 may be significantly lower than the tax changes themselves. To assess how important this factor might be, we consider a variety of alternative adjustments.

To begin, we model the impact under the liquidity-constraint hypothesis, following the basic approach of Zeldes (1989), who divided his sample into two groups of households, according to whether they had with at least two months of income in non-housing wealth, and found that

households with a reasonable level of liquid wealth do smooth consumption shocks in something approaching an optimal fashion.[11]

Our approach places a similar fraction of households in the low-wealth category to Zeldes's 68 percent, with our share ranging among the different years in our sample from a low of 61 percent to a high of 78 percent. We then assume, for simplicity, that households that are low wealth are also liquidity-constrained, and consume all reductions in tax payments concurrently, while the remaining households consume none of these tax reductions. The fraction of income of households in our low wealth-income category is lower than the fraction of households in this category, since higher-income households are less likely to be classified as liquidity-constrained. Still, this share of standardized AGI varies between 48 percent and 65 percent during our sample period, a range that lies somewhat above the share implied by the estimates by Campbell and Mankiw (1989). Thus, this approach to the identification of liquidity-constrained households probably produces an upper bound for the consumption response to tax changes.

Just as the share of income going to liquidity-constrained households is smaller than the population share of such households, we should expect their share of the aggregate income tax response to be smaller still, because of the progressivity of marginal tax rates. As the first series in Figure 2 shows, this is indeed the case. This series shows how the tax automatic stabilizer increases consumption. These numbers should be compared to those of the first series in Figure 1, which includes the change in the income tax, excluding the EITC, for all individuals. In the earlier figure, for example, the tax response to a change in income was .21 in 1995. Here in Figure 2, the consumption out of that tax response is estimated as .10, indicating that just over half (that is, (.21-.10)/.21) occurs among those not liquidity-constrained – a group comprising 32 percent of households and 44 percent of standardized AGI. Over the entire period, the estimated

consumption response associated with the income tax automatic stabilizer ranges between 9 percent and 15 percent, again peaking in 1981.

The second series in Figure 2, which includes payroll taxes and the EITC, shows that these two factors (mostly the former) contribute even a larger share of the consumption response than of the tax response in Figure 1. Because payroll taxes are concentrated almost entirely among the group we deem to be liquidity-constrained, almost all of the tax change resulting from a shock to income translates into a change in consumption. Thus, by 1995, about one-fourth of the estimated cushioning impact of the tax system on consumption derives from changes in the payroll tax, rather than the income tax. With the rise in the payroll tax over time, this means that the estimated impact of this combined stabilizer in 1995 is at a level as high as it was in the early 1980s. Adding the correction for inflation, before 1985, has the expected impact but leaves 1981 as the peak year.

Thus far, our calculations have assumed that the shock to income is spread uniformly in proportion to initial income, with no impact on the income distribution. Yet, several authors have estimated that the income of lower-income individuals is more cyclically sensitive to macroeconomic conditions, as measured by fluctuations in aggregate income or the unemployment rate (for example, Blank, 1989; Cutler and Katz, 1991; Blank and Card, 1993; Hoynes, 1999). As lower-income individuals are more likely to be in the category we classified as being liquidity-constrained, attributing a greater share of the income shock to them might increase the estimated aggregate consumption response. We highlight the word "might" because such individuals also have a smaller share of their income shock initially cushioned by taxes, so the estimated consumption effect would increase only if their higher consumption response to reduced taxes offset their lower tax response to reduced income.

To get a sense of the importance of income distribution shifts, we use the results of Blank and Card (1993, Table 6), who estimate that a 1-percent increase in aggregate income would be associated with percent income increases by income quintile of 0.72, 1.41, 1.33, 1.05 and 0.89, respectively, from the lowest to the highest quintile. We apply these percentages to our sample and calculate the change in taxes divided by the change in aggregate income. The results of this adjustment on the estimated consumption response, for the income and payroll tax combined, are illustrated in Figure 2 by comparing the series just discussed with that labeled "Variable Income Response." The impact of the adjustment is to increase the estimated consumption response, but only slightly. That is, the fact that more of the income shock is being attributed to constrained households outweighs the fact that these households have a lower change in taxes to begin with.

The numbers in this last series are, in a sense, our best estimate of the impact of income-induced tax changes on consumption. They indicate that, contrary to what one might have expected from the decline in marginal tax rates over time, there has been no downward trend in the role of the tax system in stabilizing aggregate demand through household tax changes. We estimate that about one-seventh of the initial shock to household income would be offset by changes in household consumption. Given that the 1995 ratio of adjusted gross income to GDP was roughly 57 percent, this suggests that about 8 percent of an initial shock to GDP would be offset by changes in private consumption. We should add, though, that even this figure may overestimate the response, as it classifies as liquidity-constrained many high-income households. For comparison, the last series in Figure 2 presents consumption responses based on a much simpler assumption, that every household in the bottom three quintiles is liquidity-constrained and none in the top two quintiles are constrained. The very low values of this series – ranging between 4 and 6 percent of the assumed income shock – illustrate the point made earlier, that as most of the taxes are concentrated among

higher-income individuals, these individuals must account for a share of any large automatic consumption response.

Stabilization on the Supply Side

In the past, references to the automatic stabilization of output have almost always referred to the stabilization of aggregate demand. This is consistent with the assumption that the level of employment is demand-determined, and not on the labor supply curve. In this framework, only changes in the demand for labor will affect the quantity of labor hired in the market.

However, to the extent that employment levels are also determined by labor supply conditions, a tax system with rates rising with respect to income might also serve to stabilize output. When output fell, the lower marginal tax rates could encourage greater labor supply; conversely, when output rose, the higher marginal tax rates could discourage labor supply. The impact would work through incentive effects of marginal tax rates, rather than through changes in tax payments. Moreover, the temporary nature of the change in income, which works against the effectiveness of demand-side stabilization, reinforces the supply-side impact. If leisure is a normal good, permanent increases in the after-tax wage have an income effect that discourages labor supply and works against the substitution effect of the wage change. But this offsetting income effect is largely absent from temporary wage changes.

Figure 3 illustrates this mechanism, in the context of labor market equilibrium. Imagine an initial equilibrium at point ***A*** at the intersection of labor demand curve **D** and labor supply curve **S**, with the resulting employment level L^0 and before-tax wage rate w^0. Some exogenous shock, say to productivity, lowers the labor demand schedule to **D'**. If we ignore the impact of marginal tax rates on labor supply, this shock results in a decline in employment and the before-tax wage to L^1 and w^1, respectively, as shown at point ***B***. But, as L and w fall, so does labor income, wL, and hence the

marginal tax rate workers face, thereby mitigating the decline in the after-tax wage rate and stimulating labor supply. The effect of this decline in the marginal tax rate is to make the labor supply curve steeper, offsetting the decline in labor supply as the before-tax wage falls (and, conversely, offsetting the increase in labor supply should the before-tax wage rise). Employment falls to L^2, as shown at point ***C***, rather than to L^1, and of the initial income shock, (w^0L^0-w^1L^1), an amount $w^1(L^2$-$L^1)$ is offset.

The general point that marginal tax rate variations can influence output fluctuations is certainly not new. However, we have found little discussion in the literature of these variations serving as an automatic stabilizer. Perhaps the closest point to ours is in Agell and Dillén (1994), who study the optimal design of a progressive income tax to stabilize output fluctuations in a model that stresses Keynesian price rigidities but also incorporates variable labor supply.

How large an effect might such marginal tax rate changes have? If we focus only on first-round effects (i.e., ignoring subsequent effects of the induced increase in labor supply on the before-tax wage and marginal tax rate), there are two steps here. First, it is necessary to calculate how much the initial change in output – the shift from point ***A*** to point ***B*** in Figure 3 – will affect the after-tax wage rate though the mechanism of changing the marginal tax rate. Then, the question is what change in labor income will result from the labor supply response to the change in the after-tax wage rate – the shift from point ***B*** to point ***C*** in the figure. The net stabilization offset will equal the product of these two terms: the change in the after-tax wage with respect to the change in income times the change in labor income with respect to the change in the after-tax wage. This product, in turn, is roughly equal to the product of the labor supply elasticity and the change in the marginal tax rate with respect to a unit proportional change in income.[12] (For a 1-percent change in income, we would multiply the resulting change in the marginal tax rate by 100.)

Estimates of the elasticity of labor supply with respect to changes in wages vary, of course. We must remember that because the change in the after-tax wage is assumed to arise from cyclical variation, it should be short-lived, making the income effect small from a lifetime perspective. Thus, the appropriate elasticity is one that primarily reflects the substitution of current leisure for current and future consumption and future leisure. Based on the recent life-cycle labor supply literature,[13] a range of between 0.3 and 1.0 should be viewed a reasonable for the elasticity of labor supply with respect to changes in wages.

Given these estimates, the upper bound for the proportional income offset to a 1-percent change in income is the associated change in the marginal tax rate itself, multiplied by 100. For example, if a 1-percent fall in income reduced the marginal tax rate by 0.1 percentage points, or 0.001, then, for a labor supply elasticity of 1.0, the resulting outward shift in the aggregate supply curve would be 0.1, or 10 percent, of the initial decline in output.

Figure 4 presents estimates of the impact of income changes on marginal tax rates, averaged over the population in proportion to labor income.[14] The three series in the figure correspond to the first three in Figure 2, incorporating different components of the tax system. As one would expect, the patterns in this figure are similar to those in Figures 1 and 2, with the sensitivity of marginal tax rates peaking around 1981, when tax progressivity peaked and, like tax progressivity, falling after the Tax Reform Act of 1986. The EITC effect (not shown separately) is small, slightly reducing the marginal tax rate (due to individuals passing out of the phase-out range with rising income). The impact of the payroll tax is more significant and counter to its impact on the demand side. Here, it reduces the tax system's impact, affecting those just below the payroll tax ceiling who experience a decline in their marginal tax rates in moving above the ceiling. However, this effect may be somewhat overstated, because it does not take into account the fact that earnings above the ceiling

also do not count in subsequent benefit calculations.[15] As in earlier calculations, incorporating the added change in nominal income due to inflation magnifies the measured effect before 1985.

Overall, the potential stabilizing impact through marginal tax rate changes has fallen considerably over time. Even in 1995, though, the marginal tax rate response to a 1-percent increase in income was 0.08 percentage points, a reduction that might induce a supply shift in the range of 0.02—0.08 percent of GDP — that is, an offset of between 2 percent and 8 percent of the initial shock. The upper end of this range is the same as the consumption response just estimated, suggesting that supply-side response may be an important part of the picture, to the extent that observed employment reflects supply as well as demand shifts.

Other Channels

It is generally agreed that taxes account for essentially all of the automatic response to real economic fluctuations, at least at the federal level. For example, in its evaluation of the effect of slower economic growth on the federal budget, CBO (2000) attributes a negligible amount to changes in outlays. The logic is straightforward: discretionary spending is, after all, discretionary, not automatic, and interest payments and the most important mandatory spending programs, Social Security and Medicare, are based on longer-term factors.

On the federal tax side, we have already considered the impact of personal income and payroll taxes which, together, account for the vast majority of federal revenues – fully 82 percent in 1999 (CBO, 2000). However, there are other potentially important channels through which fiscal policy might effectuate automatic stabilization, through other federal taxes and through taxes and spending at the state and local level. Here, we consider two potentially important channels, the corporate income tax and unemployment compensation. This examination is not exhaustive,

though, as it leaves out many other expenditure programs that might also have some automatic stabilization effects, such as Temporary Assistance to Needy Families (TANF) and food stamps.

Corporate Taxes

Corporate income taxes account for a much smaller share of revenue and GDP than do individual income taxes or payroll taxes; in 1999, just 10 percent of federal revenues and 2 percent of GDP (CBO, 2000). Moreover, unlike individual income taxes, corporate income taxes are not progressive – a given change in income will produce a proportional change in taxes, with that proportion equal to the tax rate. Thus, for a given income fluctuation, corporate taxes would change by a smaller percentage amount than would taxes on individual income.

However, corporate profits are more volatile than GDP, and so corporate income taxes account for a greater share of tax fluctuations than this small share of receipts and low tax elasticity would suggest. For example, between 1989 and 1992, as the growth of real GDP slowed, individual income taxes fell by 0.5 percent of GDP (from 8.2 to 7.7 percent), while the ratio of corporate taxes to GDP fell by 0.3 percent (from 1.9 to 1.6 percent). Thus, based simply on the relative size of its fluctuations, the corporate income tax is a potentially important source of automatic stabilization.

As emphasized above, though, any changes in tax payments must translate into changes in aggregate demand for automatic stabilizers to succeed. For corporate income taxes, the effect on consumption is tenuous, because the household ownership of corporate stock is highly concentrated among individuals who are very unlikely to face liquidity constraints (Auerbach and Hassett 1991). Thus, any sizeable impact must occur through corporate investment. With flexible and forward-looking capital markets, however, temporary changes in corporate tax payments should have little impact on the long-term incentive to invest. The effect, then, as in the case of household consumption, must rely primarily on the presence of liquidity constraints, in this case the existence

of firms whose investment policies depend on current liquidity, holding investment opportunities constant.

The importance of liquidity constraints for corporate investment remains the subject of dispute in the literature. Fazzari, Hubbard and Petersen (1987) identify the presence of such effects, but their findings have been challenged by Kaplan and Zingales (1997) and Cummins, Hassett and Oliner (1997) and supported by Gilchrist and Himmelberg (1998). It is beyond the scope of this paper to resolve this dispute.

To the extent that the literature has identified the presence of liquidity constraints on firm investment, it has been among smaller firms with arguably greater problems of asymmetric information and weaker access to capital markets. The relevant question for our exercise, which the literature thus far has failed to address, is how large are the corporate tax fluctuations over the business cycle among these firms. Even though the corporate income tax is essentially a proportional one, it applies asymmetrically to income and losses; that is, it does not provide a refund for tax losses. Thus, firms with losses experience no change in their current tax liability if these losses increase or decrease slightly. As having tax losses may be strongly related to facing liquidity constraints, the relevant tax fluctuations might be small, even if the size of the liquidity-constrained sector were not. This offers an intriguing subject for future research.

Unemployment Compensation

Unemployment insurance benefits, paid through state-operated programs, fluctuate in response to the rise and fall in unemployment that are one characteristic of aggregate economic fluctuations. The relationship between output fluctuations and changes in the level of unemployment benefits is complicated, depending on the relationship between output and unemployment, the extent of unemployment covered by unemployment insurance, the rate of take-

up of benefits by those eligible, and the formulas that determine the fraction of lost wages replaced by unemployment insurance.

For our purposes, though, it is not necessary to estimate separately the impact of each of these factors. Instead, to get a rough idea of the magnitude involved, one can simply look at the year-to-year fluctuations in unemployment benefits over the business cycle. For example, around the 1990-91 recession, annual unemployment insurance benefits went from of $14.9 billion in 1989 to a high of $26.7 in 1991, a rise of $11.8 billion, or about 0.20 percent of GDP (Economic Report of the President, 2000). Over this same period, real GDP grew by 1.7 percent in 1990 and -0.2 percent in 1991, which, relative to a potential growth rate of, say, 3.0 percent year, represents a cumulative GDP gap of 4.6 percentage points. Thus, the growth in benefits was about 0.20/4.6 or about 4 percent of the associated GDP gap. Estimates by Gruber (1997) suggest that the about half of an increase in received unemployment benefits is consumed, indicating an offset of roughly 2 percent of the initial GDP shock – about one-fourth of the demand effect associated with the income and payroll taxes. This comparison may understate the relative importance of unemployment insurance somewhat. The earlier estimates were that that more than one-half of the reductions in income and payroll taxes are consumed, and it seems unlikely that a smaller share of the rise in unemployment benefits would be consumed than of the reduction in tax payments. Still, the role of taxes as an automatic stabilizer appears to be several times larger than that of unemployment insurance benefits.

Indeed, the simple calculation here may overstate the automatic stabilizer role of unemployment insurance in several ways. Unemployment tends to lag the business cycle, so that the fluctuations in output and benefits are not contemporaneous. This lag would also undercut the effectiveness of unemployment insurance as an automatic stabilizer of output shocks.

Further, not all fluctuations in unemployment benefits are "automatic," because benefit rules regarding maximum weeks of coverage are typically relaxed by act of Congress or state legislatures during periods of elevated unemployment. Thus, not all of the increase in benefits that occurs after the onset of a recession can necessarily be attributed to the action of automatic stabilizers.

Conclusion

Despite the many changes in the U.S. economy and its tax system since the early 1960s, there has been relatively little net change in the role of the tax system as an automatic stabilizer. Taking changes in the income tax, the payroll tax, the income distribution, and indexing provisions into account, and factoring in heterogeneity with respect to consumption responses and income volatility, we estimate that the tax system's effectiveness at stabilizing aggregate demand was somewhat lower in 1995 than at its estimated peak in 1981, and roughly the same as in the early 1960s, when those in the top marginal income tax bracket faced a tax rate of 91 percent. The most important single source of automatic stabilization of aggregate demand probably occurs through tax-induced consumption responses, which offset perhaps as much as 8 percent initial shocks to GDP, but possibly less, depending on how one estimates the consumption response. While the size of this offset may seem modest, it is broadly consistent with results based on simulations of current large-scale macro models, such as the FRB/US model used by the Federal Reserve Board (Cohen and Follette 2000).

We also suggest that other sources of automatic stabilization may matter, too; in particular, the progressive income tax may help to stabilize output via its effect on the supply of labor, and this effect may even be of similar magnitude to the more traditional path of stabilization through aggregate demand.

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Figure 1. The Change in Taxes with Respect to Before-Tax Income

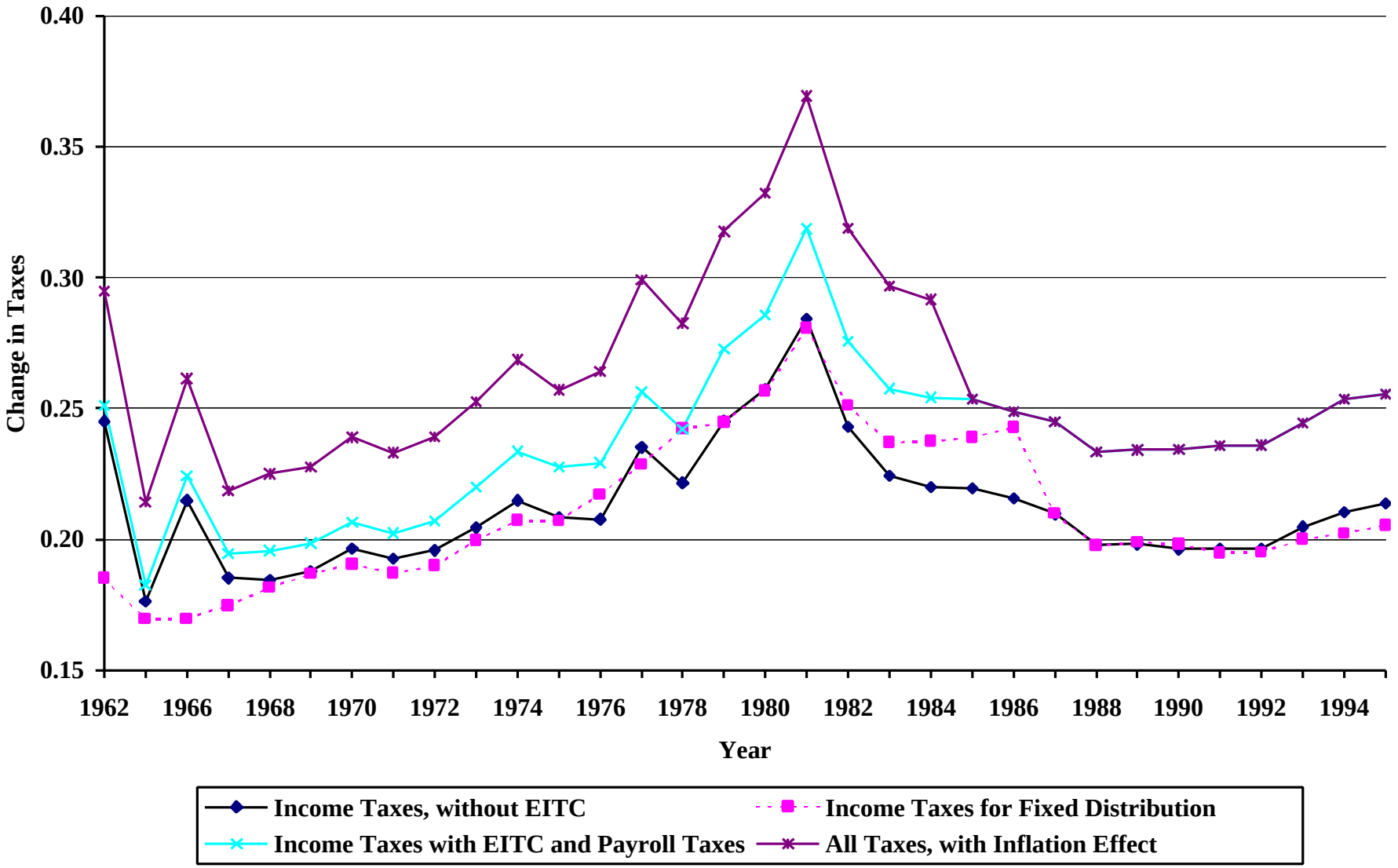

Figure 2. The Consumption Response via Induced Tax Changes

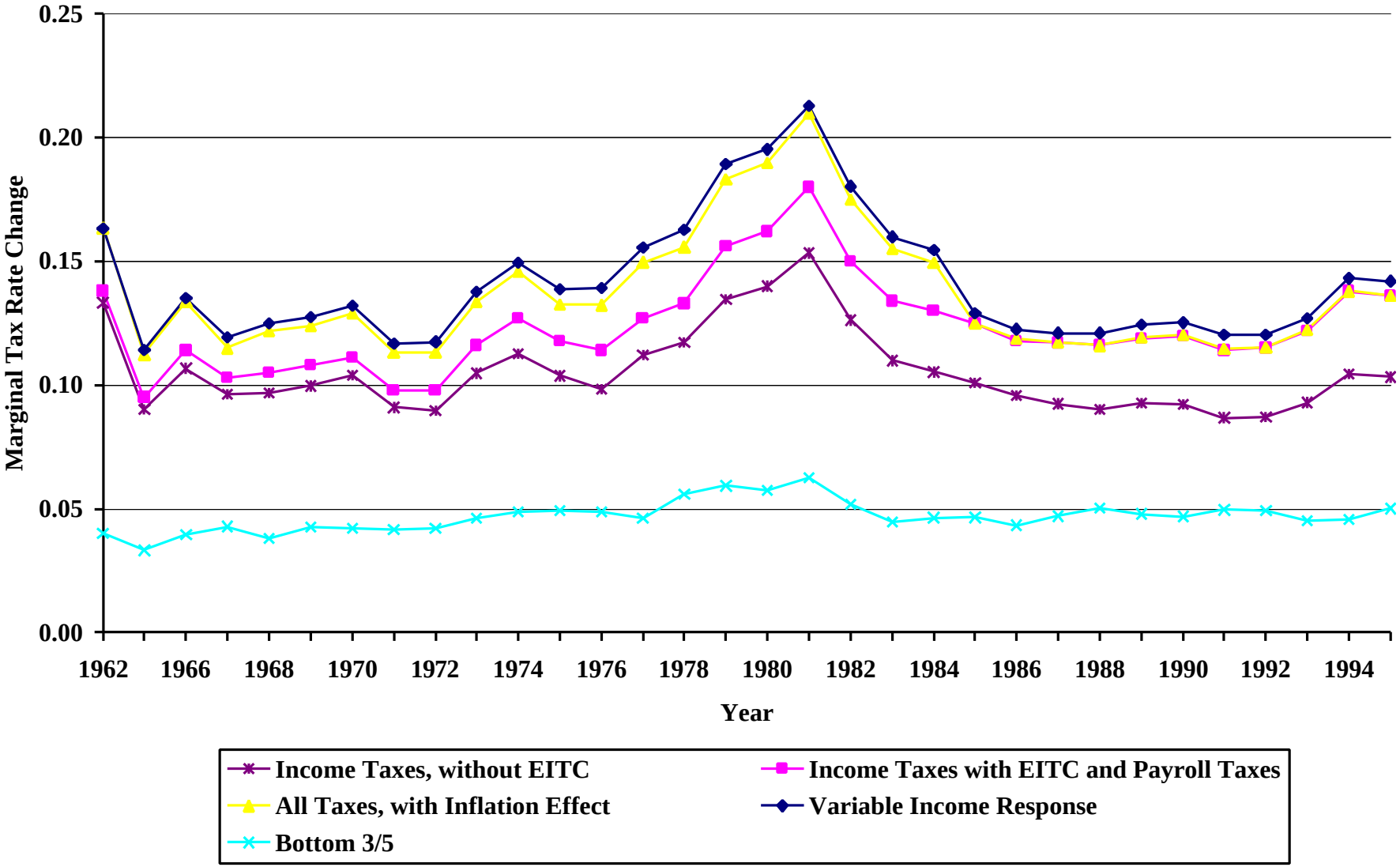

Figure 3. Stabilizing Effects on the Supply Side

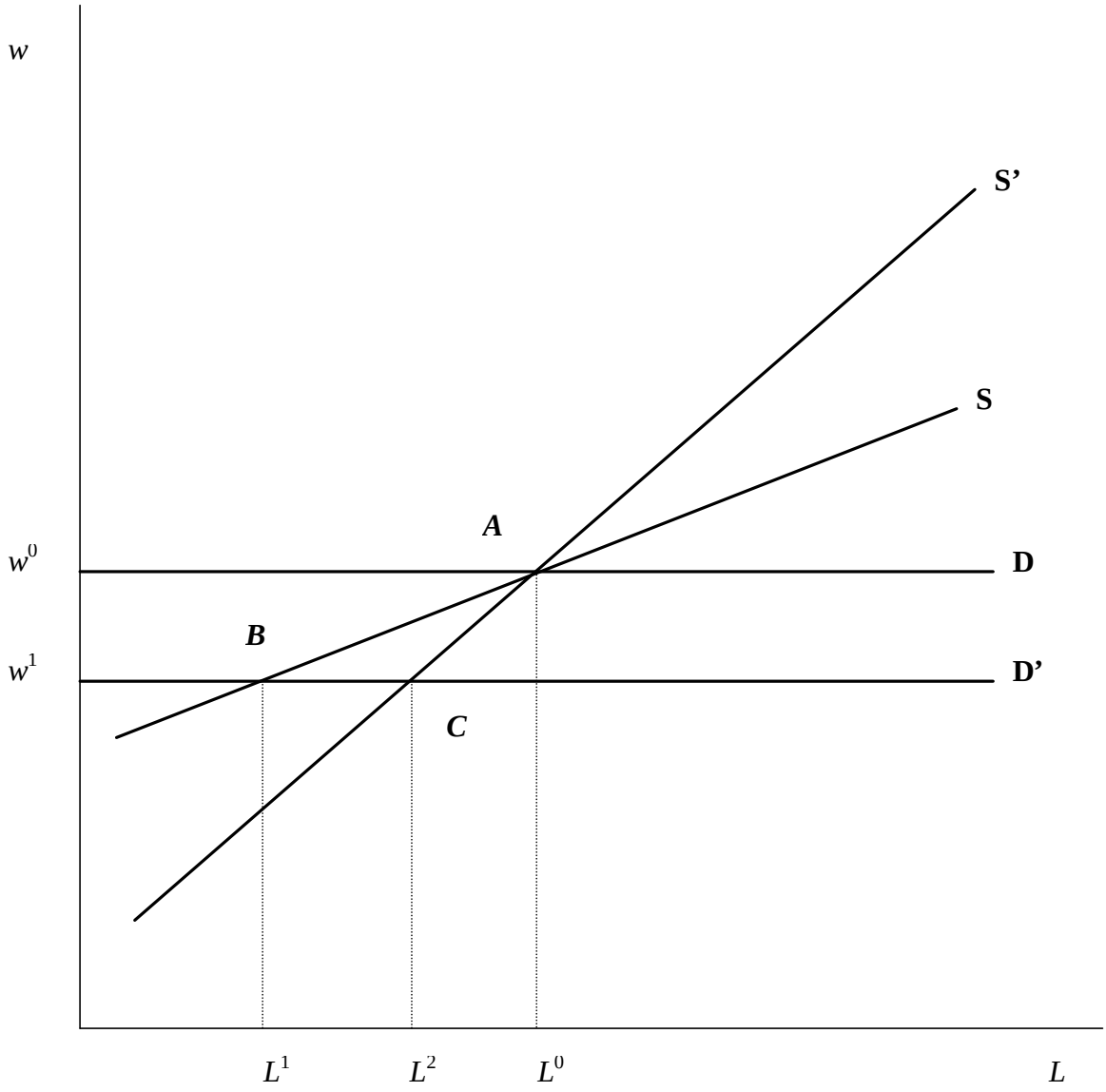

Figure 4. The Response of Marginal Tax Rates to Before-Tax Income

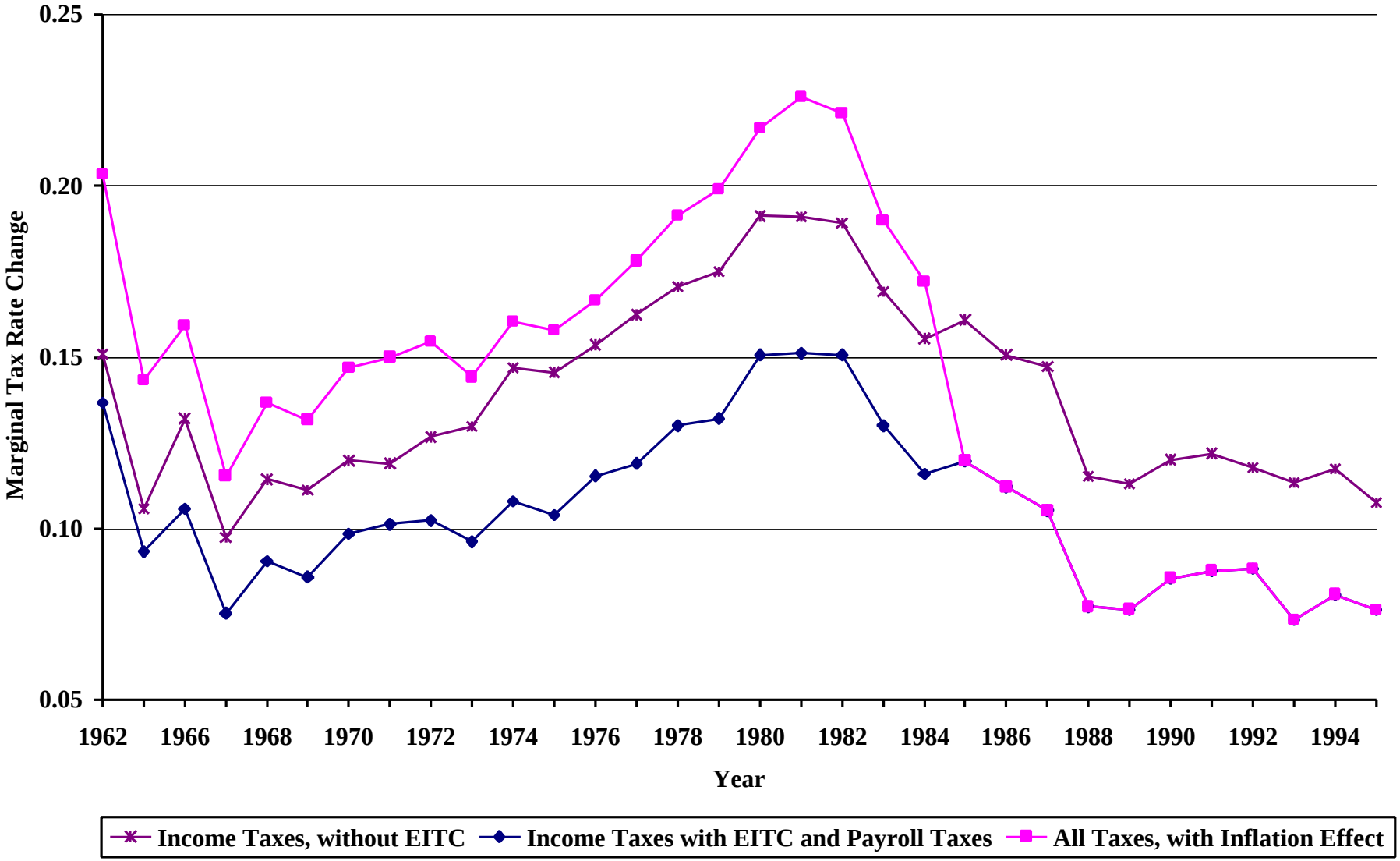

Table 1. The Change in Taxes with Respect to Before-Tax Income, by Quintile

	QUINTILE				
YEAR	1st	2nd	3rd	4th	5th
		Income Taxes, without EITC			
1962	.03	.13	.15	.19	.33
1967	.05	.13	.15	.15	.23
1974	.05	.13	.15	.18	.28
1981	.15	.18	.22	.25	.34
1988	.07	.12	.15	.17	.24
1995	.06	.11	.14	.18	.26
		Income Taxes, with EITC			
1962	.03	.13	.15	.19	.33
1967	.05	.13	.15	.15	.23
1974	.05	.13	.15	.18	.28
1981	.14	.20	.22	.25	.34
1988	.06	.14	.16	.17	.24
1995	.02	.16	.18	.18	.26
		Income Taxes with EITC + Payroll Taxes			
1962	.06	.15	.17	.19	.33
1967	.08	.16	.18	.15	.23
1974	.10	.18	.20	.20	.28
1981	.20	.25	.28	.31	.35
1988	.12	.20	.22	.24	.25
1995	.08	.22	.24	.25	.28

Endnotes

1. Some of these studies and their results are discussed by Goode (1976), Appendix E. There have been relatively few contributions to this literature in more recent years.

2. Our extensions from Pechman include the consideration of more recent years, the decomposition of changes over time, the inclusion of payroll taxes, which have grown in importance since the period Pechman studied, and the tracing through of estimated consumption responses. Although our methodology differs from Pechman's in a number of ways, our results are generally consistent with his for the period of overlap.

3. The TAXSIM model is described more fully in Feenberg and Coutts (1993).

4. The impact of this ceiling was actually more complicated, as discussed by Lindsey (1981).

5. These provisions were enacted in 1981 as part of the Economic Recovery Tax Act, but delayed in their implementation.

6. Our approach here is consistent with the assumption that as before-tax income falls, the incidence of the payroll tax remains the same.

7. The change in inflation per unit change in output, dp/dY, should equal the ratio of the short-run Phillips curve slope relating inflation to unemployment, dp/du, and the Okun's Law relationship relating output to the unemployment rate, dY/du. Recent estimates of Okun's Law put the latter term at around 2; the slope of the short-run Phillips curve has been more volatile, but a value of 1 seems reasonable; hence the value of $dp/dY = ½ = 0.5$ used in the calculation.

8. We set this effect to zero from 1985 on, even though some less important elements of the tax code were not indexed for inflation.

9. While our data and calculations run only through 1995, it is likely that the values for more recent years are not much different from those of 1995. The only significant tax legislation of the period, the Taxpayer Relief Act of 1997, was quite modest in its effects on marginal tax rates.

10. The term "liquidity constraint" doesn't necessarily imply an absolute inability to borrow. Even a mild version, reflected by a substantial difference between borrowing and lending rates, could lead households to time their purchases of durable goods to coincide with the arrival of temporary cash infusions. The cost of distorting the timing of durables purchases would be offset by the benefit of avoiding the spread between borrowing and lending costs.

11. In this calculation, wealth is measured as the capitalized value of interest income (at the Treasury 3-month bill rate) and property income (at the Standard and Poor's 500 Stock Index dividend yield). Property income includes dividends, estate and trust income, rents and royalties.

12. For a fixed before-tax wage, the change in the after-tax wage with respect to income is $-w\,dt/dY$; the change in labor income with respect to the change in the after-tax wage is $w\,dL/d[w(1-t)]$. The product of these two terms may be written $-(a/(1-t))h\,dt/d\ln Y$, where h is the elasticity of labor supply with respect to the after-tax wage, w(1-t), and a is labor's income share, wL/Y. As the terms a and (1-t) are about the same size (around .75), the stabilization term is roughly equal to the response of the marginal tax rate to a unit proportional income change, $dt/d\ln Y$, multiplied by the labor supply elasticity, h.

13. See, for example, Blundell, Meghir and Neves (1993), Browning, Hansen and Heckman (1998), Mulligan (1998), and Ziliak and Kniesner (1999). As life-cycle labor supply estimates typically do not take liquidity constraints into account, it is not clear how to adjust these estimates for households that are liquidity-constrained.

14. Because we are estimating labor supply responses, it is appropriate to weight by labor income, rather than AGI. Our measure of labor income includes wages and salaries plus self-employment income reported on Schedule C.

15. Note, though, that this offset would be far from complete for households near the payroll tax ceiling, given the progressivity of the benefit formula.