How Does the Elasticity of Taxable Income Affect Economic Efficiency and Tax Revenues and What Implications Does this have for Tax Policy Moving Forward?

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Prepared for the
American Enterprise Institute's conference on

Tax Policy Lessons from the 2000s

May 30, 2008

* I would like to thank David Weiner and Ed Harris for helpful comments.

Any views expressed are those of the author and should not be interpreted as those of the Congressional Budget Office or the American Enterprise Institute.

[T]axes are frequently so much more burdensome to the people than they are beneficial to the sovereign.
– Adam Smith, *The Wealth of Nations*

I. Introduction

While research into the elasticity of taxable income (ETI), which measures the responsiveness of reported taxable income to changes in tax rates, dates back to at least Lindsey (1987), recognition of its importance as a central parameter for tax policy design did not begin to take hold until the second half of the 1990s.[1] In fact, a 1998 survey of public and labor economists' views on key policy parameters (Fuchs, Krueger and Poterba, 1998) included no questions on the ETI.[2] I suspect that a 2008 survey would include such questions, just as I suspect that a 1998 conference on "Tax Policy Lessons from the 1990s" would not have included a session on the elasticity of taxable income. Perhaps the two 1998 survey questions most likely to provide some inference into public economists views on the ETI asked about the effect of the Tax Reform Act of 1986 (TRA 86) and the Omnibus Budget Reconciliation ACT of 1993 (OBRA 93) on long-run (steady state) GDP. For TRA 86, a fundamental reform that broadened the tax base and substantially lowered marginal tax rates, the median response was that steady-state GDP would rise by one percent. However, the interquartile range was large, ranging from 0.20 to three percent of GDP. For OBRA 93, which raised marginal tax rates on primarily upper-income groups, the median response was zero, with an interquartile range from -0.5 to one percent of GDP. It is noteworthy that

[1] Specifically, the ETI equals the percentage change in reported taxable income associated with a one percent increase in the net-of-tax rate, where the net-of-tax rate equals the share of the next dollar of reported taxable income that is not taxed, or one minus the marginal tax rate.
[2] The survey did include questions on labor supply elasticities and narrower questions regarding behavioral responses to taxation.

half of public economists surveyed thought that raising marginal tax rates on top high income groups (in 1993) would result in *increased* steady-state GDP.

Disagreement among public economist as to the effect of taxes on the economy is embodied by the views of two former chairmen of the President's Council of Economic Advisors (CEA). One former chairman, Martin Feldstein, estimated that the 1993 tax increases substantially increased deadweight loss (DWL) and that repealing the rate increases could actually *increase* tax revenue because positive behavioral responses would more than offset the mechanical revenue loss – i.e., the loss in tax revenue absent any behavioral responses (Feldstein 1995a and 1999). Subsequently, another former CEA chairman, Joseph Stiglitz, viewed the 1993 tax increases in a quite different light: "The Clinton experience showed that raising taxes on the rich does not have the adverse effects that the critics claimed." Additionally, Stiglitz (2004) is very critical of the Bush tax cuts, while Feldstein supports the lower marginal tax rates.[3] One could argue that the two former CEA chairmen take such different positions on recent tax policy because of differing political ideologies or party allegiance. However, a more plausible explanation is that they hold very different views as to how responsive individuals are to changes in tax rates. Feldstein's estimates for the effects of repealing OBRA 93, for example, rest on an ETI estimate that is toward the high end of the literature – although not implausible.[4] Stiglitz, on the other hand, while not

[3] Most tax legislation, and especially the Bush tax cuts, encompass more than simply changing the rate structure. Some opposition, or support, for tax measures may be due to those other factors, and not necessarily to the changes to marginal tax rates.

[4] While the estimate is toward the high-end of the current literature, it was less so at the time Feldstein was writing.

directly speaking to the ETI, believes that behavioral responses to tax rates are small (at least for high income individuals). If the ETI is very small, then the revenue and efficiency implications from repealing OBRA 93 would be quite different from those estimated by Feldstein.

Developments in Assessing the Efficiency Implications of Taxation

Economists have long recognized that taxation creates economic inefficiency by distorting the relative price between leisure and all other goods in the economy. Even a broad-based income tax can have substantial efficiency costs, so long as leisure remains untaxed. Harberger (1964) uses this as motivation for comparing the efficiency implications of direct versus indirect taxation and in so doing shows how labor supply elasticities can be used to measure the efficiency implications of income taxation. Harberger's analysis won over the profession and led to increased research into labor supply elasticities, which where seen as proxies for the efficiency costs from taxation.[5] More than two decades later, Lindsey (1987) examined the ETI, as opposed to the labor supply elasticity. However, Lindsey emphasized the revenue implications of the ETI and not its efficiency implications.

Feldstein (1995a), in addition to producing ETI estimates, went much further in describing the behaviors that could affect taxable income and in arguing that many of these behaviors were not captured by labor supply elasticities. Thus, it is more accurate to state that

[5] Specifically, it is the compensated elasticity (or the substitution component of the overall elasticity) that is important for measuring efficiency. Compensated elasticities measure the portion of the overall response attributable to changes in relative prices (as opposed to the portion of the response due to changes in income). It is the distortion in relative prices that leads to losses in efficiency.

taxation creates economic inefficiency not only by distorting the relative price between labor and leisure, but more broadly by distorting the relative price between goods or activities that are taxed and those that are not taxed, since leisure is not the only untaxed activity. For example, in response to taxes, not only work hours, but also work effort might change. Compensation can shift between taxed forms to non-taxed forms. When tax rates are higher, more compensation is paid in tax-exempt fringe benefits, instead of wages. And, economic activity may shift from jurisdictions with more burdensome taxes to others where taxes are more favorable; evasion is another response to taxation that confers DWL, but does not imply increased leisure. In response to higher tax rates, people are more likely to understate their incomes and to overstate their deductions. Over the long-run, taxes also influence investment decisions, including how much education to pursue and in what occupations to specialize.

Feldstein (1999)[6] shows that one parameter, the ETI, can capture this wide array of behavioral responses and can then be used to calculate both the efficiency and revenue implications from a change in tax rates. In fact, as shown in this paper, the ETI along with information on marginal tax rates and income is all that is necessary to calculate changes in both tax revenue and efficiency.[7] In Harberger's model, labor is the only source of income, all income is taxed when earned and thus taxable income equals labor income and the ETI

[6] An NBER working paper version of the 1999 article was released several years earlier, in 1995.

[7] There are exceptions when assessing efficiency and revenue implication from a tax change is complex. For example, suppose tax rates rise and, in response, taxable income falls, but, a portion of that drop in taxable income is due to increased charitable contributions (and suppose those charities produce positive externalities). Or, suppose that a tax increase is used to finance an under-provided public good. In instances such as those, where external costs or benefits are present, assessing efficiency implications is more complex.

with respect to the tax rate is the same as the labor supply elasticity – or at least the elasticity of labor *earnings* since labor hours and labor earnings may be imperfectly correlated due to factors such as work effort.[8] Feldstein's model is more complex, recognizing that income comes from many sources and those sources are taxed differently (or sometimes not taxed at all). Taxpayers can shift income, as well as alter their tax deductions, exclusions, and credits; some of those behaviors result in income escaping the tax base (going untaxed), while others allow taxpayers to shift when and under what base (e.g., individual versus corporate) income is reported and taxed. Taxpayers also have some discretion over what share of their income is reported to the tax authorities. In this more realistic setting, taxable income and labor income (and their corresponding tax elasticities) can differ substantially.

Implications of the ETI on Efficiency and Tax Revenue

The remaining sections of this paper focus on developments in ETI research over the first decade of the 21st century and relate them to important tax issues that the U.S. will face over the next few years. I discuss important empirical and theoretical developments over this period. Next, I examine the two most important "Bush" tax cuts, the Economic Growth Tax Relief and Reconciliation Act (EGTRRA) of 2001 and the Jobs Growth Tax Relief and Reconciliation Act (JGTRRA) of 2003.

These Bush tax cuts changed our tax system in many ways, including lowering individual marginal tax rates. The tax changes, however, are not "permanent" – i.e., for the most part,

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[8] However, Harberger does separately examine the effects of taxing savings.

the federal tax system will, after 2010, revert to its 2001 state unless additional legislation is enacted. I use a range of ETI estimates from the literature to show how allowing the individual income tax rate cuts to expire might affect economic efficiency and tax revenues. For example, based on 2005 data, I estimate that returning individual income tax rates to their 2001 levels would raise revenues by $98.6 billion dollars assuming no behavioral responses.[9] At an ETI of 0.2, $15.6 billion ($12.2 billion from the federal income tax and $3.4 billion from payroll and state taxes) of this mechanical increase would be lost due to reductions in taxable income. At an ETI of 0.8, $62.4 billion (($48.8 billion from the federal income tax and $13.6 billion from payroll and state taxes) of the mechanical revenue gain would be lost. The DWL per dollar of additional revenue from the federal income tax is also highly sensitive to the ETI: ranging from $0.18 at an ETI of 0.2 to $1.25 at an ETI of 0.8. When offsets to revenue from payroll and state taxes are taken into account the range is from $0.19 to $1.72.

I also calculate Laffer curves (which show the relationship between marginal tax rates and tax revenue) under a range of different ETI assumptions, with special attention focused on the top tax bracket. There is considerable debate about the degree to which changes to tax rates affect revenues. This analysis is not intended to settle this debate, but rather to show what ETI assumptions are implicitly associated with the different points of view. Again, estimates are quite sensitive to the ETI. At an ETI of 0.2, the estimated Laffer tax rate for the

[9] This is not a revenue projection for 2011, but rather applies projected 2011 rates to 2005 data. A projection for 2011 would account for expected income growth through 2011, as well as other factors that would affect revenues.

top tax bracket is 78 percent; at an ETI of 1, the estimated Laffer rate is just 41 percent – or slightly higher than the current effective marginal tax rate for this group.

II. Developments in ETI Research since 2000

Slemrod (2002) presents a taxonomy of the ways in which people respond to taxation and the costs associated with this behavior. These can be condensed to four broad areas:

1) *Real behavior* involves individuals changing their consumption or the amount they work, moving away from taxed goods or activities toward those that are untaxed or more lightly taxed. It also includes the shifting of income across tax bases or to jurisdictions where tax rates are more favorable. The labor supply elasticity (which measures the trade-off between time spent on labor and leisure) captures only a portion of that response.

2) *Timing of income receipt* also can respond to taxes. Sammartino and Weiner (1997) show overall AGI patterns that are consistent with large transitory shifting at the top of the income distribution surrounding the Omnibus Budget and Reconciliation Act of 1993 (OBRA 93). The timing of executive compensation has also been shown quite responsive to OBRA 93 (Goolsbee, 2000).[10] Changes to the tax treatment of capital gains in 1987, 1997 and 2003 all appear to have had a large short-term influence on realization behavior. Even the timing of marriages, births and deaths appear to be influenced by tax considerations.

3) *Circumvention* includes both illegally (evasion) and legally (avoidance) bypassing the tax system. In the case of evasion, income is concealed or at least not reported to the tax authorities. (See Slemrod and Yitzhaki (2002) and Slemrod (2007).) In the case of avoidance, income is shifted (intertemporally or between

[10] However, Hall and Liebman (2000) suggest that the large transitory response observed by Goolsbee could reflect the exercising past stock options and stock appreciation rather than a response to changing tax rates.

sources) in order to receive more favorable tax treatment. Diverting income into a tax-deferred retirement account is an example of avoidance. Higher tax rates generally increase the benefits from evasion and avoidance.[11]

4) *Administration and compliance* policy affect how people respond to taxes. Rigorous enforcement and low compliance costs should limit evasion and lead to smaller income responses of reportable taxable income to tax changes. The benefits from such polices must be weighed against the government's additional costs of administering and enforcing the tax system, since these costs also represent a loss to society. In contrast, lax enforcement and high compliance costs will tempt taxpayers to hide income, and thus result in larger changes in taxable income when rates change. That implies that, instead of structural parameters, taxable income elasticities are endogenous and a function of institutions. The time and money that taxpayers spend complying with tax laws and regulations is also a substantial source of deadweight loss (Guyton, O'Hare, Stavrianos and Toder, 2003).

Behavioral changes have efficiency implications. To assess them accurately requires differentiating real behavioral changes that affect resource allocation from accounting maneuvers that simply re-label income. Or, to differentiate the shifting of activity from inside to outside of the tax base from other behavioral changes that shift income from one tax base to another tax base. For example following the Tax Reform Act of 1986, Subchapter S income increased nearly three-fold as income was shifted from Subchapter C corporations to Subchapter S corporations (because the 1986 act set the tax rate on Subchapter S income was below that on Subchapter C income). That shift of income was simply a transfer from one tax base to another, but since individuals do not report Subchapter C income, only half

[11] Following Slemrod and Yitzhaki (2000), "avoidance" refers to avoiding the tax, but not avoiding the activity. For example, choosing leisure is one way to avoid paying income tax, but that decision falls under real substitution and not avoidance, because the consumption bundle has changed as a result of the tax.

of the picture was in view: the increase in Subchapter S income. Thus, without information on the drop in Subchapter C income, the relationship between the marginal income tax rates and taxable personal income can have misleading implications for both economic efficiency and tax revenues.

Issues that Complicate Estimation

The primary methodological objective in the empirical literature is to devise a method for parsing the response of taxable income to changes in taxes from the many other factors that also affect taxable income. Tax changes take place in a changing economic environment in which changes to that environment affect income growth. Adequately controlling for those non-tax-induced trends in taxable income poses a major challenge to estimating elasticities. In addition, a sound methodology must address several other important issues, including mean reversion, tax rate endogeneity, institutional changes (which often coincide with changes in the rate structure), and the distinguishing between transitory (or temporary) and permanent (or longer-term) responses. Those complicating issues are discussed in more detail below.

Exogenous Shifts in the Income Distribution and Mean Reversion

The distribution of reported income has widened over the past thirty years. That trend accelerated in the 1980s, especially at the very top of the distribution. According to Piketty and Saez (2003), the share of income reported by the top 10 percent of filers rose by more than forty percent, from 33 percent in 1979 to 46.8 percent in 2006, with nearly two-thirds of that increase accruing to the top 1 percent of taxpayers.[12] The share of income reported by the top one-half of one percent more than doubled, the share reported by the top one-tenth of one percent nearly tripled, and the share reported by the top one hundredth of one percent more than quadrupled. Because people with the highest income pay a disproportionate share of taxes – the top 1 percent pay approximately one-third of all federal income taxes – their behavior is especially important.[13] Not fully accounting for the portion of that income growth that was unrelated to tax policy can result in large biases. For example, the 1980s cuts in marginal tax rates were greatest at the top of the income distribution and thus inversely correlated with the great income growth at the very top of the distribution. The fact that the income growth at the top of the income distribution is jagged (while following a decidedly upward trend) makes controlling for it even more difficult. If the non-tax related portion of that income growth is not fully accounted for, that trend will bias ETI estimates in a positive direction when tax rates fall (and in a negative direction when tax rates rise).

Mean reversion is another issue that complicates estimation. Over a person's lifetime, income often follows a general path with many fluctuations. After a period when income is particularly high or low it will often revert to a more normal path. That phenomenon is especially pronounced at the tails of the distribution. Those at the extreme right of the income distribution are often not there for long, and will likely have a substantial drop in income (that is unrelated to tax policy). At the other extreme, those in school (or not employed) will often have large

[12] For income shares updated to 2006, see www.econ.berkeley.edu/~saez/TabFig2006prel.xls.
[13] See www.irs.ustreas.gov/pub/irs-soi/01in01ts.xls.

increases in income upon entering the workforce. Not accounting for that mean reversion at the tails of the distribution can substantially bias estimated elasticities. More specifically, not fully controlling for mean reversion will erroneously count non-tax-related increases (by those below their lifetime path) and decreases in taxable income (by those above their lifetime path) as responses to changes in tax rates. Those factors will bias ETI estimates in opposite directions, depending on whether tax rates are raised or lowered, but there is no reason to believe the biases will cancel each other out. Partly for that reason, many studies exclude those with very low earnings. Those at the high end cannot be so easily discarded, since they are responsible for a large share of both taxable income and tax revenues.

These issues are further complicated by the fact that the size of taxable income elasticity appears to vary across the income distribution. I.e., estimated ETIs are generally larger (sometimes much larger) for higher-income groups. In such cases, Navratil (1995) shows that some of the early differences-in-differences approaches will produce biased estimates. Additionally, if the ETI does in fact vary with income, a single overall elasticity will not be applicable when considering the impact of rate changes that target only part of the income distribution or that differ in magnitude across the distribution.

Transfers between Economic Agents

Chetty (2007) warns that the large elasticities found for high income groups may overstate the efficiency implications of this group's behavior. Chetty suggests that behavioral responses by upper income filers are more likely to reflect the shifting of economic activity to other agents in the economy or that in some cases sheltering income has external transfer costs – and thus a difference between the private and social costs of avoiding taxes. Carroll (1998) notes the possibility of income shifting between economic agents. For example, a highly paid lawyer may reduce his workload in response to a tax increase targeted at high earners, but his reduction may shift business to lawyers in lower tax brackets. As an example of transfer costs, Chetty suggests that an executive may be deterred from taking a larger share of compensation in the form of fringe benefits because doing so would require offering more fringe benefits to other employees in the firm. Another case of transfer costs involves the potential for fines imposed by the IRS. The expected value of these fines represents a cost to a subset of taxpayers. However, this is not a deadweight loss to society as a whole because the cost to those evading taxes is exactly offset by additional revenues "transferred" to the government.

Endogeneity of the Tax Rate

Because of the federal tax system's progressivity, it is almost axiomatic that a simple cross-section regression will show a direct relationship between tax rates and taxable income. Even with longitudinal data, an individual's tax rate rises with taxable income. In order to isolate the impact of taxes on taxable income, tax rates should be imputed based on an instrumented (or exogenous) measure of taxable income. After instrumenting, the correct relationship between taxable income and the tax rate should be achieved for each individual, but that method does not address the cross-sectional correlation between taxable income and tax rates. Studies using cross-sectional variation for identification generally must also include differencing methods (which transforms the key dependent variable to the change in the tax rate).

Institutional Factors: Contemporaneous Tax Policy Changes

Institutional changes to the tax system, taking effect contemporaneously with rate changes, could affect reported taxable income, biasing estimated elasticities, or at least complicating the estimation. In fact, Slemrod (1996) shows that changes to the underlying tax base may result in pre- and post-tax-change elasticities that differ substantially. Most regression techniques yield a weighted average of the two elasticities.

Most elasticity measures also assume policies towards tax evasion and avoidance as given, when in fact those too are choices that can change. Recent work emphasizes the role of institutional factors (Slemrod and Kopczuk 2002, Kopczuk 2005) showing that the elasticity of taxable income is not a structural parameter, but rather a function of the tax system. Taxpayers are more responsive when opportunities to avoid taxes are more prevalent (or less costly). Features that influence responses to taxes include the availability of substitutable forms of compensation (such as the ability of firms to use non-taxable fringe benefits as opposed to taxable compensation) as well as the expected penalties for evasion.

The definition of taxable income itself may influence results. Changes to the tax system may alter that definition. Using the concurrent definition for taxable income (that is, the definition that was in effect when the income was received) will confound responses to tax rates with statutory changes to the tax base. But even if a consistent measure is chosen, Slemrod (1998) shows that estimates may depend on the definition used and that even a constant-law definition can yield biased results. And, Heim (2007a) shows that taxable income elasticities will be biased if the definition of taxable income changes, unless the cross price elasticities between goods whose tax status changes and those that are always taxable are zero.

Transitory Versus Permanent Responses and Income Shifting

Permanent, or longer-term, behavioral responses to tax changes are of primary importance; transitory responses are a lesser concern. For illustration, suppose that in 1986 it was well-known that the tax rates were set to fall beginning in 1987. That change could induce both short- and longer-term responses. In the short-term, some may have delayed the receipt of income from December of 1986 to January of 1987. That response would not have affected real economic behavior and would not have impacted long-term taxable income. By contrast, a persistent change in investment or labor market behavior would have represented a longer-term response, affecting the allocation of resources and taxable income for years to come. That is not to say that transitory behavior is always small or trivial. For example, capital gains realizations rose by over 96 percent from 1985 to 1986 in anticipation of less-favorable treatment of capital gains set to begin in 1987.

Separating transitory from permanent responses is often difficult. Measuring changes in taxable income in the year prior to and the years succeeding a tax change will likely yield a combination of permanent and transitory responses. Phase-in periods and taxpayer expectations about future tax legislation also matter. For example, if rate cuts phase in, people not only divert income (on paper) to the future, but may also substitute leisure in the short-term for work in the future when the rates are fully lowered. In that instance, intertemporal substitution could result in a near-term understatement and a longer-term overstatement of the ETI.

A related issue is the relationship between tax policy and long-term career and investment decisions. Tax policy can affect investment in both human and physical capital, which over time could influence taxable income. That long-run response is important in measuring the true response to tax changes, but may not be fully observed for many years following a tax change, leading to an understatement of the ETI.

Recent ETI Estimates

As the obstacles to identification have become better recognized, more sophisticated methods and richer datasets have been used to estimate the ETI. A striking result is that ETI estimates, while remaining quite sensitive to a wide array of factors, have tended downwards from the earliest estimates by Feldstein (1995) and Lindsey (1987). These first studies reported estimated ETIs of between 1 and 3. More recent studies report estimates closer to 0.4, but estimates still range from close to 0 to greater than 1. In addition to sensitivity to specification decisions, researchers have also found estimates to vary across time and across the income distribution.

An influential study by Gruber and Saez (2002) examines taxable income responses to the tax cuts of 1981 and 1986 using a panel of tax returns for years 1979 through 1990. Their approach laid the groundwork for papers by Kopczuk (2005), Giertz (2006, 2007) and Heim (2007a, 2007b). Gruber and Saez calculate constant-law income using 1990 law excluding capital gains and using NBER's TAXSIM model to estimate federal and state tax rates. They then apply two-stage least squares, regressing the log of the income growth (over three-year intervals) against the log change in the net-of-tax rate (NTR) plus year fixed effects and dummies for marital status.[14] Recognizing the possibility of mean reversion and secular trends in income, they explore two additional specifications, which include:

1) The log of initial period income as an independent variable; and,
2) A 10-piece spline of the log of initial period income.

They are most confident in an income-weighted estimated ETI of 0.40 from the model that includes a ten-piece spline based on the natural log of initial period income. The spline allows the functional relationship between the dependent variable and the independent variables to vary by decile. Gruber and Saez's corresponding elasticity for a broader measure of income is much smaller, 0.12, suggesting that much of the taxable income response comes through deductions, exemptions, and exclusions, rather than changes in labor supply.

Kopczuk (2005) uses the same panel as Gruber and Saez to estimate the ETI and to test the hypothesis that ETI is not a structural parameter, but rather a function of the tax system's structure. Kopczuk models taxable income as a function of not just tax rates, but also the

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[14] An income effect variable is also discussed, but is left out of their most-preferred specification.

interaction between tax rates and the size of the tax base, which is used as a proxy for the cost of shifting funds outside the tax base. Additionally, Kopczuk treats mean reversion and divergence within the income distribution as separate phenomena by including separate variables to control for them. Kopczuk (2005) estimates are extremely sensitive to both sample selection and model specification. However, he does find evidence of a relationship between the size of the tax base and the ETI – favoring a specification which finds that a one percentage point increase in the tax base lowers the ETI by 0.79 percent.

Giertz (2007) uses a panel of tax returns from 1979 to 2001 (that heavily oversamples high-income filers) in order to estimate taxable income and broad income elasticities. Applying the methods of Gruber and Saez he reports an estimated ETI for the 1980s that is slightly larger than Gruber and Saez, but the analogous estimate for 1990s is less than half as large (0.20). Following Kopczuk (2005), Giertz includes separate and nonlinear controls for mean reversion and divergence within the income distribution. This explains about one-third of the difference between the 1980s and 1990s estimates, lowering the 1980s estimate to 0.40 and raising the 1990s estimate to 0.26. Additionally, Kopczuk's work implies that changes to the tax base since 1986 could account for a portion of the remaining difference.

Heim (2007a) and Giertz (2006) use a variety of approaches to estimates taxable income elasticities for years covering the OBRA 1990 and 1993 tax increases. Heim's preferred specification yields estimated ETIs ranging from 0.46 to 0.58 depending on how long the interval over which income changes are measured. Both papers attempt to control for adjacent year income shifting when measuring behavioral changes over several year intervals. When measuring behavioral responses from 1991 to 1994, for example, controlling for adjacent years shifting recognizes that 1991 income may have been influenced by income shifting between 1990 and 1991 (since tax rates rose in 1990) and 1994 income may have been influenced by shifting between 1993 and 1994 (since tax rates rose in 1993). Both papers report estimates that are quite sensitive to an array of factors. Heim concludes that the range of estimates reported in the paper often "resulted from small changes in the specification, includes most a priori educated guesses as to what the taxable income elasticity would be…suggest[ing] that it may never be possible to pin down the taxable income elasticity with any reasonable degree of accuracy."

Heim (2007b) is one of the first papers to look at responses to the 2001 and 2003 tax cuts. The papers use a panel of individual tax returns spanning years 1999 to 2005. Heim measures responses over three year intervals, employing controls common to the literature since Gruber and Saez (2002), and reports a "best estimate" of around 0.25 when not accounting for adjacent year income shifting. However, much smaller and statistically insignificant estimates are reported when accounting for adjacent year shifting, yielding him to conclude that most of the response to the tax changes was intertemporal (or transitory) income shifting. The large estimated coefficients on the adjacent year tax rates are somewhat puzzling in this instance. With tax rates rising, there is an incentive to shift income to an earlier period. This would likely involve shifting of income from 2003 to 2002. Marginal tax rates for moderate an upper income groups fell only slightly prior to 2003, but fell substantially in 2003 when JGTRRA, passed in

May of 2003, expedited the phase-in of rate cuts schedule to phase-in over the next few years. However, the 2003 rate cuts were a surprise. For such an unanticipated drop in rates, there would be no (or very little) opportunity to shift income backward.

In another paper, Auten, Carroll and Gee (forthcoming) also use 1999 to 2005 tax return data to measure behavioral responses to the 2001 and 2003 tax cuts. They compare behavior over two-year intervals and restrict their sample to filers ages 25 to 61 with more than $50,000 in taxable income. Instead of controlling for mean reversion and divergence in the income distribution by using a function of base year (or lagged) taxable income, they include variables on financial income, proxies for entrepreneurship, as well as regional and occupational dummies. In addition, they include functions of age and number of children in the family. They report a population-weighted estimated ETI of 0.35 (almost identical to their income-weighted estimate). Including taxpayers over age 61 lowers their estimate to 0.28. Restricting the sample to those with incomes over $200,000 raises their ETI estimate to 1.09.

In another paper looking at recent tax changes, Singleton (2007) uses CPS data linked to Social Security earnings records to examine behavioral responses to changes in tax rates from EGTRRA's provision to reduce the "marriage penalty." The marriage penalty results in some married couples paying more in taxes than they would had they not been married. As mentioned earlier, this provision substantially lowered MTRs for married couples with taxable income ranging $46,700 and $54,193 (in 2002 dollars). This provision did not alter MTRs for single filers or filers with incomes above or below this range. Singleton reports overall estimated elasticities that range from 0.16 to 0.66, with estimates varying based on education and other demographics. These estimates are for earned income and not full taxable income.

Most of the recent empirical ETI research has relied on panel data. An exception to this trend is Saez (2004) who builds on work by Slemrod (1996) and Feenberg and Poterba (1993) by using aggregated time-series data spanning years 1960 to 2000. Saez uses a consistent definition of income (that more closely approximates AGI less capital gains, as opposed to taxable income) and average marginal tax rates for different income groups. Saez's study does not focus primarily on a single tax change, but examines the responses to all of the tax changes over the past four decades.

Regressing the log of taxable income against the log of the net-of-tax rate plus a time trend polynomial results in a statistically insignificant estimated ETI of 0.20. For the top 1 percent of the taxable income distribution, Saez reports a much larger and statistically significant ETI estimate of 0.50. Corresponding ETI estimates for the bottom 99 percent of the distribution are negative (but not statistically different from 0).

Saez reports estimated ETIs that vary greatly over some subsets of the 40 years examined. For example, dividing the change in log income from 1981 to 1984 by the change in logged net-of-tax rates between the same two years yields an estimated ETI of 0.77. The same analysis, comparing 1985 to 1988 yields a much larger estimated ETI of 1.7. Comparing 1991 with 1994 yields an estimated ETI of about 0. The variation in ETIs over time is consistent with Goolsbee

(1999) and Giertz (2007) who both find very different elasticities when employing identical techniques to different time periods.

Saez also employs a regression framework that uses taxable income shares to estimate ETIs for different segments of the taxable income distribution. Special attention is paid to the top 1 percent of filers. For the various taxable income groups, Saez regresses the log of the group's share of taxable income against the log of the net-of-tax rate. Without any time trends, that yields an estimated ETI of 1.58 for the top 1 percent. Including both the time trend and square of the time trend yields an estimated ETI of 0.62. Saez expresses confidence in the 0.62 estimate because that regression has an adjusted coefficient of determination of 0.98 and the fitted values do an excellent job of tracking the trend in the share of income reported by the top 1 percent.

Further segmentation of the income distribution shows that, even among the top 1 percent of the distribution, estimated ETIs vary greatly by income. In fact, the same approach that yields 0.62 for the top 1 percent yields an estimated ETI of 1.09 for the top 0.01 of one percent. For those in the 90th to 95th percentiles, the same approach yields a negative (although statistically insignificant) estimated ETI.

III. Applying the ETI for Tax Policy

The method used in Section V to assess changes in marginal tax rates is presented by Saez (2004). Saez, building on the work of Feldstein (1999), breaks the change in revenues resulting from an increase in tax rates on the top tax bracket into a mechanical and behavioral response, such that

$$\Delta Revenue = N \cdot \Delta EMTR \cdot (z - \bar{z}) \cdot \left[1 - ETI \cdot \left(\frac{z}{z - \bar{z}} \right) \cdot \left(\frac{EMTR}{1 - EMTR} \right) \right].^{15} \qquad (1)$$

Here, z is average taxable income for those in top rate bracket, $\bar{z}$ is the level of taxable income where the top tax rate kicks in, and N is the number of taxpayers in the top bracket. As defined earlier, *EMTR* is the effective marginal tax rate and *ETI* is the elasticity of taxable income. The first part of equation (1), $N \cdot \Delta EMTR \cdot (z - \bar{z})$, equals the *mechanical response*, or the change in tax revenue assuming no behavioral responses. Thus, if *ETI* equals 0, there is no behavioral response and tax revenue increases linearly with the tax rate. The second piece inside the brackets, $ETI \cdot \left(\frac{z}{z - \bar{z}} \right) \cdot \left(\frac{EMTR}{1 - EMTR} \right)$, is the share of the mechanical response that is offset by changes in behavior. If this share is greater than 1, it implies a Laffer response – i.e., an increase in the MTR results in a decrease in tax revenue. Note that the Laffer (or revenue maximizing) rate equals $\left(1 \Big/ \left(1 + \left(z \big/ (z - \bar{z}) \right) \cdot ETI \right) \right)$. And, that rearranging equation (1) to highlight revenue changes from the mechanical and behavioral responses yields

$$\Delta Revenue = \overbrace{N \cdot \Delta EMTR \cdot (z - \bar{z})}^{\textit{Mechanical Response}} - \overbrace{ETI \cdot \Delta EMTR \cdot N \cdot z \cdot \left(\frac{EMTR}{1 - EMTR} \right)}^{\textit{Behavioral Response} \,=\, \textit{Marginal Deadweight Loss}}. \qquad (2)$$

[15] Tax rate changes at lower brackets can be analyzed analogously by focusing on the group of taxpayers facing the marginal rates in the bracket whose rate is changing. However, with a tax rate increase there will also be a gain (and with a decrease in the tax rate there will also be a loss) in revenues from those with incomes in the higher brackets. In section IV, I assume that a change in tax rates for a lower tax bracket results in no behavioral responses by those in higher tax brackets; although, it is possible that there could be a response to the income effect.

Finally, the behavioral response is also exactly equal to the change in DWL resulting from the tax rate change.[16] The behavioral response from equation (2) encompasses revenue changes from the federal, payroll and state tax bases combined – even for a tax increase in just the federal rate – because the bases overlap. By imputing income at the new tax rates, z', where

$$z' = z \cdot \left(1 - eti \cdot \left(\frac{dt}{1-mtr}\right)\right), \tag{3}$$

one can calculate the overall the revenue offset to the individual income tax separately from the overall change in revenues. Thus, the change in federal revenue from raising the rate on the top income tax bracket, an when accounting for behavioral responses, can be expressed such that

$$\Delta Federal\ \mathrm{Re}venue = N \cdot \Delta EMTR \cdot (z' - \bar{z}) - N \cdot federal\_EMTR \cdot (z - z') \tag{4}$$

Note that total efficiency costs from the tax system, as opposed to the incremental costs of a change in rates, can be expressed such that

$$Deadweight\ Loss = 0.5 \cdot \left(\frac{EMTR^2}{1-EMTR}\right) \cdot ETI \cdot \sum_{i=1}^{N} (z - \bar{z}), \tag{5}$$

which is analogous to the traditional Harberger DWL formula. Other things being equal, tax increases for upper income groups will result in greater DWL because these groups face higher EMTRs and because the DWL increases by the square of the tax rate.

[16] Again, for more detail on how these responses are calculated, see Saez (2004).

IV. Data & Institutional Background

One of the most significant economic policy initiatives of the Bush administration has been the lowering of marginal tax rates on ordinary individual income, as well as rates on capital gains and dividends. In order to garner enough political support for the tax cuts, the administration agreed to labyrinthine legislation, in which most of the provisions phase-in and phase-out (or end abruptly) between 2001 and 2011. These tax changes remain a hotly contested issue, in part, because they are set to expire after 2010, when tax rates are scheduled to revert to their 2001 levels, but also because of the U.S.'s long-term fiscal outlook, in which, absent substantial changes, government expenditures are projected to exceed revenues at an unprecedented rate.

The centerpiece of the Bush tax cuts was the Economic Growth Tax Relief and Reconciliation Act (EGTRRA) of 2001, which lowered marginal tax rates and expanded allowable credits and deductions. This was followed by the 2003 Jobs Growth Tax Relief and Reconciliation Act (JGTRRA), which accelerated the marginal rate cuts from EGTRRA that were not set to fully phase-in until 2006. Additionally, JGTRRA substantially lowered tax rates on capital gains and dividends. Another provision of EGTRRA reduced the marriage penalty by expanding the size for the 15 percent tax bracket for married filers only.[17] Table 1 shows the marginal tax rate schedules (for the individual income tax) before EGTRRA and after JGTRRA. For those at the 28 percent statutory rate and above, marginal income tax rates are scheduled to rise by roughly 10 percent after 2010. The consequences of letting these tax cuts expire (as measured both in terms of tax revenue and in terms of economic efficiency) is the focus of the next section.

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[17] This sub-group is not broken out in IRS (2007). Thus, I assume that individual MTRs return their pre-EGTRRA levels, except that marriage penalty relief is extended.

Table 1. Federal Individual Income Tax Schedule (in 2005 Dollars)

2000 & 2011 Tax Rates	2003–2010 Tax Rates	Single filers	Married Filing Jointly*	Married Filing Separately	Head of Household
15%	10%	0 to $7,300	0 to $14,600	0 to $7,300	0 to $10,450
15%**	15%	$7,301 - $29,700	$14,601 - $59,400	$7,301 - $29,700	$10,451 - $39,800
28%	25%	$29,701 - $71,950	$59,401 - $119,950	$29,701 - $59,975	$39,801 - $102,800
31%	28%	$71,951 - $150,150	$119,951 - $182,800	$59,976 - $91,400	$102,801 - 166,450
36%	33%	$150,151 - $326,450	$182,801 - $326,450	$91,401 - $163,225	$166,451 - $326,450
39.6%	35%	$326,451 or more	$326,451 or more	$163,226 or more	$326,451 or more

* The same schedule applies to qualifying widow/widower.

** This assumes that marriage penalty relief would be extended.

The difference between the projected 2011 rate schedule and the schedule for 2003-2010 is the percentage point change in the tax rate for each group of taxpayers. More specifically, this is the change in statutory MTRs. Because, I am looking at the effect of allowing the individual rates to rise, while maintaining other features of the tax system, I assume that this also represents the projected change in the effective marginal tax rate (EMTR). However, the EMTR – i.e., the share of an additional dollar of income that is paid to the government – is often somewhat different from the statutory MTR because the EMTR takes into account phase-ins, phase-outs and other interactions with the IRS code. These other factors affect the actual share of income that the government receives.[18]

Consider the personal exemption phase out (PEP), which requires taxpayers to reduce their personal exemption by 3 percent for each dollar that their income exceeds the phase out floor (and until the personal exemption is reduced to zero). Thus, taxable income increases by $103 for every additional $100 of income during the phase out range. The EMTR is then equal to the MTR plus 0.03 times the MTR, or for someone in the 35 percent tax bracket, 36.05 percent (i.e.,

[18] See CBO (2005) for an analysis of EMTRs on labor income.

1.03 times 35). According to CBO (2005) and as presented in Table 2, when all the intricacies of the tax code are taken into account, EMTRs for the individual income tax range from -1.6 percent for those not paying income tax, but sometimes receiving refundable tax credits (such as the earned income tax credit) to almost 35 percent for the top two statutory tax brackets. The remaining columns of Table 2 show what happens when payroll and state taxes are also included. While the individual income tax hits upper income groups the hardest (at the margin), federal payroll taxes (used to finance Social Security and Medicare) hit lower income groups the hardest. EMTRs for state taxes are greatest for middle income groups. When these three taxes are combined, EMTRs range from just over 30 percent for the 10 percent bracket to over 41 percent for the 33 percent bracket.[19]

Table 2. Effective Marginal Tax Rates for 2005

Statutory Bracket	Federal EMTR	Payroll EMTR	State EMTR	Total EMTR
0	-1.6	13.5	0.9	12.7
10	14.8	12.8	2.6	30.2
15	16.3	12.5	6.1	34.9
25	26.3	10.0	3.7	40.0
28	30.1	5.3	3.7	39.0
33	34.7	3.2	3.5	41.3
35	34.7	2.5	3.4	40.7

While these EMTRs account for the intricacies of the tax system, they are based on standard convention, which assumes that marginal income is not used for tax preferred activities – such as charitable giving for itemizers. If a portion of income, at the margin, were used for such

[19] Note that EMTRs and MTRs can be very different from average tax rates, which simply represent total taxes divided by total income. For an analysis of average income tax rates across income groups and over time, see Piketty and Saez (2007).

activities, then true EMTRs would be lower than those reported in Table 2. However, it is unlikely that this would have much affect on prospective *change* in MTRs resulting from the expiration of EGTRRA and JGTRRA after 2010.

In addition to the information on EMTRs by tax bracket (from Table 2), two other pieces of information are crucial for employing the formulae from Section III to estimate the revenue and efficiency implication from allowing the individual tax rates to expire. One of these pieces of information is the ETI and the other is the corresponding information on the amount of taxable income that is reported in each of the individual income tax brackets. The income information is published by the IRS and is summarized in Table 3.[20]

Table 3. 2005 Individual Income and Tax Revenues by Tax Bracket

Statutory MTR	Income Total	Income at MTR	Tax Revenue Total	Tax Revenue at MTR
10	130,864	107,061	12,612	10,706
15	1,028,305	589,969	132,330	88,495
25	1,411,064	241,641	237,515	60,410
28	503,828	36,360	104,491	10,181
33	387,519	79,067	92,352	26,092
35	1,094,230	565,392	315,443	197,887
Total	4,555,810	1,619,489	894,743	393,772

Dollar values are in millions.

Table 3 shows $4.6 trillion in (modified) taxable income and nearly $900 billion in tax revenue for 2005. These numbers are somewhat smaller than totals for 2005 because they exclude filers whose top MTR is for income from capital gains.[21]

[20] See IRS (2007), Table 3.4.

[21] Total tax revenue includes some revenue from capital gains taxes, so long as capital gains were taxed at a lower rate than the filers' top rate on ordinary income.

The final piece of information, the ETI, is the trickiest. As discussed in Section II, the empirical literature on the ETI suggests a wide range of plausible estimates, and considerable disagreement surrounds the size of this parameter. Thus, instead of picking one ETI estimate from the literature, the next section shows how the cuts in individual MTRs set to expire might affect revenue and efficiency under a range of different ETIs. This is aimed to show what implicit views of the ETI may underlie different views on tax policy – especially views on the relationship between rate changes and revenues. Additionally, it will show how important the ETI is by highlighting how sensitive the estimates are to a range of estimates.

Before proceeding, some caveats are in order. The results that follow are not from a full microsimulation model with behavioral responses made at the individual level. It is possible that results from such an exercise could differ from those presented in the next section. For one, EMTRs differ within a statutory tax bracket, while here the average EMTR is applied to aggregated taxable income for each of the respective tax brackets. Two, some individuals are close to the bottom of their tax bracket, which would likely censor behavioral responses to a rise in the bracket's tax rate. Saez (2002) finds that taxpayers, by-and-large, do not bunch at the kinks, however, there are still some who are near kink points. Because I am not using individual level data, I do not censor responses. Three, income measures are taken from Table 3.4 of IRS (2007), which groups filers by their top MTR. I exclude taxpayers whose top tax rate is for capital gains income. Some taxpayers, however, have capital gains income that is taxed at a rate lower than their top rate. This income may be included in my measure. Finally, I apply

EMTRs for labor (i.e., earned) income when estimating behavioral responses. The EMTR may be the best choice, but it is imprecise. Some income, at the margin, may result from realizing capital gains; other income, at the margin, may be business income that is exempt from payroll taxes. Even if responses represent changes to earned income, EMTRs can vary depending on which member of the tax unit is reporting the additional income. Additionally, responses may reflect changes to itemized deductions, in which case the EMTR should exclude payroll taxes. The decision to use EMTRs for earned income may disproportionately bias responses for top tax brackets, since a larger share of these groups' incomes comes from sources other than labor. However, the EMTR from the payroll tax is just 2.5 percent for high income groups, whereas it exceeds 12.5 percent for the bottom two brackets. The choice of EMTR to use is problematic even when using individual level panel data.

Despite these caveats, this is a useful exercise whose results are illustrative of the range of revenue responses and efficiency consequences resulting from the expiration of the Bush tax cuts. It also shows that these questions can be broached by the vast majority of scholars who do not have access to confidential tax returns.

V. Revenue and Efficiency Implications of Expiring Tax Legislation

The mechanical change in revenues from allowing the individual rates to expire – i.e. the change in individual income tax revenues assuming no behavioral responses – is estimated here at $98.6 billion.[22] (See Table 4.) That is 13 percent greater than actual 2005 revenues.[23] For the mechanical calculation, only revenues from the individual income tax change, since taxable income does not change in responses to the change in rates. Behavioral responses, though, cost revenues to the individual income tax and from payroll and state taxes (which further offsets revenue increases from the individual income tax), since these bases overlap. About 38 percent of the mechanical increase comes from raising the 10 percent tax bracket back to 15 percent. This has the biggest effect because the rate on this bracket is scheduled to undergo the largest percentage point increase. And, because the increase in rates raises revenues not just from those facing this marginal rate, but also from filers in all of the higher brackets (who pay this rate on some of their income). The 35 percent rate bracket, which is slated to rise to 39.6, is the second most important in terms of the expected mechanical increase in revenues. This bracket accounts for nearly 23 percent (or $26 billion) of the expected increase in revenues. In contrast to raising the 10 percent bracket, here, all of the additional revenue is raised from filers in this marginal rate bracket. Less than one percent of filers face this top bracket, however, this group reported over half of one trillion dollars in 2005 taxable income (IRS, 2008).

Projecting tax revenues under a range of ETI estimates shows how much behavioral responses might reduce the mechanical gain in tax revenues. Recall that this difference between the mechanical and actual change in revenues is also equal to the efficiency cost (or deadweight

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[22] Dollar values are expressed in 2005 terms, unless otherwise noted. For comparison, CBO (2008) reports that extending the individual rates cuts, along with the child tax credit, would lower revenues by $96 billion for 2011 and $152 billion for 2012. Those estimates account for interactions with the AMT, which are ignored in this paper. The CBO numbers also account for some behavioral responses, but assume that total GDP is not affected by the rate changes.

[23] Total 2005 revenues for this paper are $894.7 billion, which is smaller than total 2005 individual income taxes because it excludes some capital gains revenues and revenues from the Alternative Minimum Tax.

loss) resulting from the tax increase. As Figure 1 and Table 4 show, a modest ETI of 0.2 would lower the gain in federal income tax revenues by more than 12 percent (or 12.2 billion) compared to the mechanical gain. (The revenue offset and total DWL, when accounting for payroll and state taxes rises nearly 28 percent to $15.6 billion.) A large ETI of 1.0 would wipe away 62 percent (or $60.9 billion) of the revenue gain plus an additional 45 percent (or $17 billion) would be lost from payroll and state revenues. Revenues from filers in the 15 percent bracket rise by $21.9 billion under each scenario even though their MTR is not scheduled to change when the cuts expire.[24] This group pays more in taxes because their taxable income that was below the 15 percent rate was taxed at 10 percent, but would be taxed at 15 percent. It is assumed that there are no income effects and thus that this group does not change its behavior. At an ETI of 0.5 – halfway between the extremes already discussed – the increase in federal revenues from the tax increase is 45 percent (or 30.5 billion) smaller than under the mechanical case plus an additional 28 percent (or $8.5 billion) would be lost from payroll and state revenues. As shown in Table 5, the one year revenue gain in federal income taxes from the expiration of the cuts in individual tax rates would equal $98.6 billion with no behavioral response; $86.5 billion when assuming an ETI of 0.2; and, $37.8 billion when assuming an ETI of 1.

In each case, 36 percent of the reduction in federal income tax revenues (compared to the mechanical case) results from behavioral responses by those 0.7 percent of filers in the top income tax bracket. And, 44 percent of reduction in federal income tax revenues are

[24] Note, if EGTRRA truly expired, the upper income limit for the 15 percent tax bracket for married filers would fall, raising tax rates over a small range from 15 to 28 percent. This changed is ignored in the analysis.

attributable to the 1.8 percent of filers in the top two tax brackets. If the ETI increases with income, as the empirical literature suggests, these shares would be even larger. Some have suggested returning rates to their 2001 levels for just the top two tax brackets. At an ETI of 0.5, this would imply just $15.4 billion more in annual revenues (from the federal income tax) and $19.9 billion in increased DWL. At an ETI of 0.2, federal income tax revenues would be expected to increase by $25.7 billion with $8 billion in additional DWL. At an ETI of 1, the tax increase would move the top two tax brackets past their Laffer (or revenue maximizing) rate. Thus, this would actually lead to a reduction in overall revenues and increased DWL.

Table 4.
Efficiency Consequences of Letting the Bush Individual Income Tax Cuts Expire

		Behavioral Response = Change in DWL					
2005 MTR	Mechanical Δ Revenue	ETI = 0.2	0.4	0.5	0.6	0.8	1.0
10%	43,015	555	1,100	1,473	1,745	2,290	2,835
15%	-	-	-	-	-	-	-
25%	17,293	5,364	10,708	13,376	16,053	21,398	26,742
28%	5,772	1,719	3,440	4,307	5,167	6,888	8,602
33%	6,522	1,567	3,123	3,901	4,689	6,246	7,808
35%	26,041	6,392	12,795	15,972	19,157	25,535	31,907
totals	98,643	15,596	31,167	39,029	46,811	62,357	77,894

Dollar values are in million of 2005 dollars.

Table 5.
Revenue Consequences of Letting the Bush Individual Income Tax Cuts Expire

			Total Revenue Change		=	Mechanical Change – DWL		
2005 MTR		Mechanical Δ Revenue	ETI = 0.2	0.4	0.5	0.6	0.8	1.0
10%	Income Tax	43,015	42,732	42,449	42,208	42,066	41,783	41,501
	Other Bases	-	-272	-534	-666	-796	-1,058	-1,321
15%	Income Tax	-	-		-	-	-	-
	Other Bases	-	-		-	-	-	-
25%	Income Tax	17,293	13,641	10,000	8,178	6,348	2,708	-937
	Other Bases	-	-1,712	-3,415	-4,261	-5,108	-6,812	-8,512
28%	Income Tax	5,772	4,411	3,055	2,378	1,700	343	-1,013
	Other Bases	-	-358	-724	-912	-1,095	-1,458	-1,817
33%	Income Tax	6,522	5,192	3,863	3,198	2,534	1,205	-123
	Other Bases	-	-237	-465	-578	-701	-929	-1,163
35%	Income Tax	26,041	20,480	14,909	12,183	9,417	3,887	-1,647
	Other Bases	-	-831	-1,663	-2,114	-2,533	-3,381	-4,219
	Income Tax	98,643	86,456	74,277	68,145	62,065	49,925	37,780
totals	Other Bases	-	-3,409	-6,801	-8,531	-10,234	-13,639	-17,032

Dollar values are in million of 2005 dollars.

Marginal Deadweight Loss

The changes in revenues and in DWL from changes in tax policy can be combined into a measure that captures the increase in DWL associated with a one dollar increase in revenues (or for a tax cut, the reduction in DWL associated with a one dollar reduction in revenues). This measure of marginal DWL simply equals the change in revenues divided by the change in DWL. Considering ETIs of between 0.2 to 1 implies a tremendous range in the efficiency costs associated with raising additional revenue (by allowing MTRs to return to their 2001 levels). See Table 6 and 6A. At an ETI of 0.2, for example, allowing the tax cuts to expire would result in a marginal DWL (per dollar of federal income tax revenue) of $0.18 – i.e., for each additional dollar the federal government receives in revenue, society would be worse off by $0.18. At an

ETI of 1, the marginal DWL rises to $2.06 per additional dollar of income tax revenue raised. At an ETI of 0.5, this number is $0.57. When accounting for revenue offsets to the other tax bases, the marginal DWL rises by just 4 percent at an ETI, but by 82 percent at an ETI of 1.0.

For comparison, Feldstein (1999) uses an individual level microsimulation model to asses the possible implications of a 10 percent increase in marginal tax rates. He concludes that, assuming an ETI of 1.04, behavioral responses would erase over two-thirds of the mechanical gain in tax revenues and that the marginal DWL would be over $2 per every additional dollar of revenue. Using more recent data and assuming an ETI of 0.4, Feldstein (2008) reports a marginal DWL of $0.76 per additional dollar of revenue raised. At an ETI of 0.4 my estimated DWL is smaller, at $0.42 per dollar of federal income tax revenue, but $0.62 when account for revenue offsets to the payroll tax and to the states. Note that Feldstein is considering a case where rates for each bracket increase by the same percentage. The case examined here is different, since brackets change by different percentages and one group (those currently in the 15 percent bracket) experiences no change in its MTR.

For a given ETI, the efficiency implications of raising tax rates vary greatly across the brackets. Those in the 15 percent tax bracket drive down the overall DWL per dollar measure because this group is assumed to have no behavioral response since its MTR does not change, but it does pay more in taxes because the 10 percent bracket rises to 15 percent. Raising the bottom (10 percent) tax bracket has only minor efficiency implications. The marginal DWL per dollar of revenue ranges from $0.01 at an ETI of 0.2 to $0.07 at an ETI of 1. This is partly because those in the lower tax brackets face a lower EMTR than those in the higher brackets and because the DWL increases by the square of the EMTR. Another reason for the low efficiency costs is that much of the additional revenue comes from those in higher tax brackets who all also have income taxed in this bracket. Since the marginal income for these higher income groups is in another tax bracket, their behavior is not affected by the rate changes (in lower brackets).[25]

For those in the 25 to 35 percent brackets, the marginal DWL measures are much larger. Allowing the tax cuts to expire for only the top two brackets, and assuming an ETI of 0.5, results in a marginal DWL of $1.30 per dollar of revenue. However, at an ETI of 0.2, the marginal DWL is over 75 percent smaller. The marginal DWL per additional dollar of revenue is greatest for the 25 and 28 percent brackets. Raising rates on this group results in behavioral responses that lower revenues, while the "windfall" revenue from those in higher brackets (that is not associated with any additional DWL) is small because there so few filers in the top two brackets.

Table 6. Marginal Deadweight Loss
(Per Additional Dollar of Federal Income Tax Revenue)

2005	ETI =					
MTR	0.2	0.4	0.5	0.6	0.8	1.0
10%	0.01	0.03	0.03	0.04	0.05	0.07
15%	-	-	-	-	-	-
25%	0.39	1.07	1.64	2.53	7.90	-
28%	0.39	1.13	1.81	3.04	20.09	-
33%	0.30	0.81	1.22	1.85	5.19	-
35%	0.31	0.86	1.31	2.03	6.57	-
totals	0.18	0.42	0.57	0.75	1.25	2.06

[25] Again, this assumes no income effects.

Table 6A. Marginal Deadweight Loss
(Per Additional Dollar of Revenue Including
Revenue Offsets from Payroll and State Taxes)

2005 MTR	ETI = 0.2	0.4	0.5	0.6	0.8	1.0
10%	0.01	0.03	0.04	0.04	0.06	0.07
15%	-	-	-	-	-	-
25%	0.45	1.63	3.41	12.95	-	-
28%	0.42	1.48	2.94	8.54	-	-
33%	0.32	0.92	1.49	2.56	22.65	-
35%	0.33	0.97	1.59	2.78	50.49	-
totals	0.19	0.46	0.65	0.90	1.72	3.75

Laffer Curves

It is widely accepted that behavioral responses to taxation (as measured by the ETI) act to offset revenue gains from an increase in tax rates and revenue losses from a decrease in rates. The degree to which this occurs, however, is a hotly contested issue. In some instances, increases tax rates can result in a reduction in revenues because the loss in revenues resulting from less reported income more than offsets the increase in revenues resulting from the higher tax rate that is applied to the income that is reported. At one extreme, the government will receive no tax revenue at a zero percent tax rate. At a tax rate of 100 percent, the government may also receive no (or at least very little) revenue. Thus, the revenue maximizing, or Laffer rate, must be somewhere between zero and 100. While the Laffer rate "optimizes" revenue collection (given other institutions in the economy), it should not be confused with an optimal tax rate, which economist use to describe a tax that raises a given amount of revenue with the least amount of distortions to the economy.

The curve which shows the relationship between tax revenue and tax rates has borne the eponym "Laffer" for 30 years now. The idea is much older, however, and is an example of Stigler's law of misonomy: i.e., no idea is named after the person who discovers it, but rather after some subsequent person. In fact, the Laffer curve was formally presented by French engineer and economist Jules Dupuit as early as the 1840s. The idea dates back much earlier: Ibn Kahaldun wrote in the 14th century that "at the beginning of the dynasty, taxation yields a large revenue from small assessments. At the end of the dynasty, taxation yields a small revenue from large assessments."[26]

Table 7 reports Laffer rates for each of the 2005 tax brackets and under the various ETI assumptions. Laffer rates are very high at the bottom brackets because much of the revenue raised from these rates comes from filers in higher brackets. Laffer rates for the upper-income brackets are much lower and are quite sensitive to the ETI. At an ETI of 0.2, the revenue maximizing rate from the top bracket is 77.5 percent – well above the current EMTR of 40.7 percent. At an ETI of 1, the picture is quite different, with the Laffer rate just slightly above the current EMTR.

[26] As quoted by Laffer (2004).

Table 7. Laffer Rates Under a Range of Different ETI Assumptions

2005 MTR	2005 EMTR	ETI: 0.2	0.4	0.5	0.6	0.8	1.0
10%	0.302	0.972	0.946	0.934	0.922	0.899	0.878
15%	0.349	0.871	0.772	0.731	0.695	0.631	0.579
25%	0.400	0.692	0.530	0.475	0.430	0.362	0.312
28%	0.390	0.693	0.531	0.476	0.431	0.363	0.313
33%	0.413	0.754	0.605	0.551	0.506	0.434	0.380
35%	0.407	0.775	0.634	0.581	0.536	0.464	0.410

Figure 2 plots the full Laffer curves for the top tax bracket under each of the ETI assumptions. The curves are generated under the assumption that the ETI is constant across all tax rates (on a given curve). In reality, little can be known about the ETI at rates far from those seen in the data. In any event, the curves illustrate the dramatic difference in the relationship between tax rates and tax revenues that exist across a range of ETIs present in the literature. For comparison, the diagonal line shows the relationship with no behavioral responses – implying that tax revenue increases at linearly with tax rates, and no Laffer point is ever reached.

VI. Conclusion

This paper reviews recent literature on the ETI, highlighting both important theoretical and empirical findings. In terms of theory, the ETI has been shown to be one of the central parameters for measuring the efficiency costs of the tax system and for measuring the revenue implications of tax changes. That said, recent research highlights instances when the ETI accurately captures the efficiency implications from a tax change and in what circumstances the parameter may over- or understate these consequences. And, other research has shown that the ETI is not a structural parameter, but rather a function of institutional features that policymakers may have under their control. On the empirical side, recent research suggests that the ETI is substantially smaller than early estimates by Feldstein (1995) and Lindsey (1987). This research also suggests that the ETI increases with income. Recent research also finds ETI estimates to be quite sensitive to an array of factors. And, the range of plausible estimates is broad.

Based on 2005 data, I estimate that returning individual income tax rates to their 2001 levels would raise revenues by $98.6 billion dollars assuming no behavioral responses. At an ETI of 0.2, $12.2 billion (or 12 percent) of this mechanical increase federal income tax revenue would be lost due to reductions in taxable income. Another $3.4 billion in revenue would be lost from payroll and state taxes. At an ETI of 0.8, $48.8 billion (or 49 percent) of the mechanical revenue gain would be lost. Another $13.6 billion in revenue would be lost from payroll and state taxes. The DWL per dollar of additional revenue from the federal income tax is also highly sensitive to the ETI: ranging from $0.18 at an ETI of 1.25 to 0.95 at an ETI of 0.8.

Laffer rates for each tax bracket and Laffer curves for the top tax bracket are sensitive to the range of ETI estimates found in the literature. An ETI of 0.2 implies a Laffer tax rate for the top tax bracket of 78 percent. On the other hand, an ETI of 1, the estimated Laffer rate is just 41 percent – or slightly higher than the current effective marginal tax rate for this group.

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