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## Taxpayer Reporting Responses and the Tax Reform Act of 1986

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### Abstract

This paper examines the effects of the Tax Reform Act of 1986 on the reporting decisions of taxpayers, using microlevel information from the 1984 and 1989 Statistics of Income. We find that tax reform clearly mattered in the reporting decisions of individuals, with reporting elasticities that cluster between 0.3 and 0.7. However, our results also indicate that individuals' estimated responses vary in different ways for individuals with different income levels, in ways that differ by the types of incomes received by taxpayers, in ways that are sensitive to the estimation approach, and in ways that depend upon data adjustment methods.

Keywords: Tax Reform Act of 1986, income reporting, taxable income elasticity, quantile regression  
JEL: H24, H31, H3

# TAXPAYER REPORTING RESPONSES AND THE TAX REFORM ACT OF 1986\*

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## ABSTRACT

This paper examines the effects of the Tax Reform Act of 1986 on the reporting decisions of taxpayers, using microlevel information from the 1984 and 1989 Statistics of Income. We find that tax reform clearly mattered in the reporting decisions of individuals, with reporting elasticities that cluster between 0.3 and 0.7. However, our results also indicate that individuals' estimated responses vary in different ways for individuals with different income levels, in ways that differ by the types of incomes received by taxpayers, in ways that are sensitive to the estimation approach, and in ways that depend upon data adjustment methods.

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# TAXPAYER REPORTING RESPONSES AND THE TAX REFORM ACT OF 1986

James Alm and Sally Wallace

## INTRODUCTION

A central focus of research in public economics has long been the measurement of individual responses to taxation. There is almost universal agreement among economists that, at least in theory, individual behavior should respond in some way to a change in marginal tax rates. In particular, a reduction in marginal tax rates should lead individuals to work more, to save more, to reduce tax avoidance activities, to report more income, and the like. However, it is in the area of the magnitude of these responses where there remains enormous disagreement. Despite the best efforts of economists, estimates of the sizes of taxpayer responses in such dimensions as labor supply, saving, capital gains realizations, charitable contributions, and compensation choice are controversial and unsettled.<sup>1</sup> The magnitudes of these responses are

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<sup>1</sup> For example, see the large differences in estimated behavioral responses in such areas as labor supply, savings, and capital gains realizations. For labor supply responses, see, for example: Jerry A. Hausman, "Labor Supply," in *How Taxes Affect Economic Behavior*, Henry J. Aaron and Joseph A. Pechman (eds.) (Washington, D.C.: The Brookings Institution, 1981, 27-72); and Thomas MaCurdy, David Green, and Harry J. Paarsch, "Assessing Empirical Approaches for Analyzing Taxes and Labor Supply," *Journal of Human Resources* 25, No. 2 (1990): 414-490. For savings responses, see: William G. Gale and John Karl Scholz, "IRAs and Household Saving," *The American Economic Review* 84, No. 5 (1994): 1233-1260; and James M. Poterba, Steven F. Venti, and David A. Wise, "Do 401(k) Contributions Crowd Out Other Personal Saving?" *Journal of Public Economics* 58, No. 1 (1995): 1-32. For capital gains responses, see: Martin Feldstein, Joel Slemrod, and Shlomo Yitzhaki, "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains," *The Quarterly Journal of Economics* 94 No. 4 (1980): 777-791; and Leonard Burman and William Randolph, "Measuring Permanent Responses to Capital-gains Tax Changes in Panel Data," *The American Economic Review* 84, No. 4 (1994): 794-809. Even in the area of the response of marital decisions to the income tax, there remains much controversy. For detailed reviews of much of this work, see: James Alm and Leslie A. Whittington, "Income Taxes and the Marriage Decision," *Applied Economics* 27, No. 1 (1995): 25-31; Julio Lopez-Laborda and Anabel Zarate-Marco, "To Marry or Not to Marry: Tax is the Question," *Public Budgeting & Finance* 24, No. 3 (2004): 98-123; and David L. Sjoquist and Mary Beth Walker, "The Marriage Tax and the Rate and Timing of Marriage," *National Tax Journal* 48, No. 4 (1995): 547-558. For a discussion of some of these controversies, see: Joel Slemrod (ed.), *Do Taxes Matter? The Impact of the Tax Reform Act of 1986* (Cambridge, MA: The MIT Press, 1992); and Alan J. Auerbach and Joel Slemrod, "The Economic Effects of the Tax Reform Act of 1986," *The Journal of Economic Literature* 35, No. 2 (1997): 589-632.

essential inputs in the estimation of the revenue effects of changes in the individual income tax, at the federal, state, and local levels of government, as well as in estimates of the efficiency and distributional effects of tax changes.

The decade of the 1980s offers some potential for unraveling the puzzle of individual responses to tax changes. There were major tax changes throughout this decade, culminating in the Tax Reform Act of 1986 (TRA86). Many studies have examined various aspects of behavioral responses to TRA86, including labor supply (Eissa and Liebman, 1996), saving (Skinner and Feenberg, 1992), housing (Follain, Leavens, and Velz, 1993), charitable donations (Clotfelter, 1992), capital gains realizations (Burman, Clausing, and O'Hare, 1994), health insurance (Gruber and Poterba, 1994), and tax shelters (Samwick, 1996).<sup>2</sup> These studies generally find that individuals respond in significant ways to federal income tax changes, although there is much debate on whether these responses represent changes in real behavior or simply changes in either the timing or the financial form of transactions (Slemrod, 1995).<sup>3</sup>

The responses of individuals to marginal tax rates in their reporting of income on tax returns are equally uncertain, and the magnitudes of these responses are a critical issue in ongoing policy debates about the effects of income taxation, especially the impact of taxes on the

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<sup>2</sup> Nada Eissa and Jeffrey B. Liebman, "Labor Supply Response to the Earned Income Tax Credit," *The Quarterly Journal of Economics* 111, No. 2 (1996): 605-637; Jonathan Skinner and Daniel Feenberg, "Savings," in *Do Taxes Matter? The Impact of the Tax Reform Act of 1986*, Joel Slemrod (ed.) (Cambridge, MA: The MIT Press, 1992, 50-79); James R. Follain, Daniel R. Leavens, and Orawin T. Velz, "Identifying the Effects of Tax Reform on Multifamily Rental Housing," *Journal of Urban Economics* 34, No. 2 (1993): 275-298; Charles Clotfelter, "Charitable Contributions," in *Do Taxes Matter? The Impact of the Tax Reform Act of 1986*, edited by Joel Slemrod (ed.) (Cambridge, MA: The MIT Press, 1992, 203-235); Leonard Burman, Kimberly Clausing, and John O'Hare, "Tax Reform and Realizations of Capital Gains in 1986," *National Tax Journal* 45, No. 1 (1994): 1-18; Jonathan Gruber and James M. Poterba, "Tax Incentives and the Decision to Purchase Health Insurance: Evidence from the Self-employed," *The Quarterly Journal of Economics* 109, No. 4 (1997): 701-733; and Andrew Samwick, "Tax Shelters and Passive Losses after the Tax Reform Act of 1986," in *Empirical Foundations of Household Taxation*, Martin S. Feldstein and James M. Poterba (eds.) (Chicago, IL: University of Chicago Press, 1996, 193-226).

<sup>3</sup> Joel Slemrod, "Income Creation or Income Shifting? Behavioral Responses to the Tax Reform Act of 1986," *The*

level of income tax collections. As in other areas of behavior, reporting responses can be, and continue to be, usefully analyzed in the period surrounding TRA86. In particular, TRA86 represents a “natural experiment” for the reexamination of individual reporting responses to tax changes, in which the structural break associated with the TRA86 allows individual responses to be identified independently of other changes in the economic environment. Feldstein (1995) and Auten and Carroll (1999) exploit this natural experiment feature of TRA86 to estimate individual reporting changes arising from TRA86, using panel data from individual tax returns.<sup>4</sup> Feldstein (1995) finds that the elasticity of reported income with respect to the tax price of reported income (defined as one less the marginal tax rate) is quite large, generally in excess of one in his preferred estimates. Auten and Carroll (1999) also estimate large, if somewhat smaller, reported income-tax price elasticities. In contrast, Gruber and Saez (2002) estimate reporting responses to the entire set of federal and state tax changes in the 1980s, including TRA86, and they find that the overall elasticity is significantly smaller, roughly 0.4; Heim (2009) finds similarly low elasticities using more recent tax changes in 2001 and 2003.<sup>5</sup> These studies, as well other studies by Lindsey (1987) and Navratil (1995) that somewhat parallel our approach here, generally find that individual reporting responses are present.<sup>6</sup> Nevertheless, as emphasized by Giertz (2007)

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*American Economic Review Papers and Proceedings* 85, No. 2 (1995): 175-180.

<sup>4</sup> Martin Feldstein, “The Effect of Marginal Tax Rates on Taxable Income: A Panel Study of the 1986 Tax Reform Act,” *The Journal of Political Economy* 103, No. 2 (1995): 551-576; and Gerald Auten and Robert Carroll, “The Effect of Income Taxes on Household Behavior,” *The Review of Economics and Statistics* 81, No. 4 (1999): 681-693.

<sup>5</sup> Jonathan Gruber and Emmanuel Saez, “The Elasticity of Taxable Income: Evidence and Implications,” *Journal of Public Economics* 84, No. 1 (2002): 1-32; and Bradley T. Heim, “The Effect of Recent Tax Changes on Taxable Income: Evidence from a New Panel of Tax Returns,” *Journal of Policy Analysis and Management* 9, No. 1 (2009): 147-163.

<sup>6</sup> Lawrence B. Lindsey, “Individual Taxpayer Response to Tax Cuts: 1982-1984,” *Journal of Public Economics* 33, No. 2 (1987): 173-206; and John F. Navratil, *Essays on the Impact of Marginal Tax Rate Reductions on the Reporting of Taxable Income on Individual Tax Returns*, Ph.D. Dissertation (Cambridge, MA: Harvard University, 1995). Both use information from samples of individual tax returns to estimate reporting changes from tax rate

and Saez, Slemrod, and Giertz (2009) in recent surveys of this literature, there remain substantial differences in the magnitude of these estimated responses.<sup>7</sup> The U.S. experience is, apparently, not an isolated one.<sup>8 9</sup>

In large part, these differences reflect some fundamental methodological issues (Slemrod, 1998; Triest, 1998).<sup>10</sup> It is quite difficult to disentangle the role of marginal tax rate changes from other events that occurred in the 1980s, especially those non-tax events (e.g., changes in the distribution of income, changes in the demands for different skill groups stemming from changes in technology or international trade) that increased the income of higher income taxpayers at the same that their marginal tax rates were falling. TRA86 also introduced other complicating changes, such as those that encouraged a change in corporation status from “C-corp” to “S-corp” and that in turn increased the level of reported taxable income for individuals (Slemrod, 1995).

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changes, and they find evidence of significant behavioral responses to changes in marginal tax rates. Of particular relevance to our work is Navratil (1995), who looks at taxpayers before and after TRA86; however, instead of using another income group for comparison, he uses a similarly defined group over a period where tax rates did not change, ending up by examining behavior over two-year intervals (e.g., 1986 to 1988). He calculates elasticities using a comparison group from years 1984 and 1986, and then again using a comparison group from years 1988 and 1990, and finally a third time using the average of the two comparison time periods (where federal tax rates do not change). His elasticities are as high as 1 for the top 3 percent of the income distribution, but are much smaller for the rest of the distribution. He also finds that the elasticities are quite sensitive to the choice of comparison years and to the definition of taxable income.

<sup>7</sup> Seth Giertz, “The Elasticity of Taxable Income over the 1980s and 1990s,” *National Tax Journal* 60, No. 4 (2007): 743-768; and Emmanuel Saez, Joel B. Slemrod, and Seth H. Giertz, “The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review,” NBER Working Paper 15012 (Boston, MA: National Bureau of Economic Research, 2009).

<sup>8</sup> For example, see: Karl Aarbu and Thor Thoreson, “Income Responses to Tax Changes – Evidence from the Norwegian Tax Reform,” *National Tax Journal* 54, No. 2 (2001): 319-334; Mary Anne Sillamaa and Michael Veall, “The Effect of Marginal Tax Rates on Taxable Income: A Panel Study of the 1988 Tax Flattening in Canada,” *Journal of Public Economics* 80, No. 4 (2001): 341-356; and Jan Selen, “Taxable Income Response to Tax Changes: Evidence from the 1990/91 Swedish Tax Reform,” FIEF Working Paper No. 177 (2002) (Stockholm, Sweden).

<sup>9</sup> It should be noted that this reporting response is not the same as, say, a simple labor supply response. Although reporting behavior will certainly be influenced by any changes in hours worked or in labor force participation rates that may occur in response to tax reform, the reporting decision is a far broader decision. It is affected also by behavioral changes in such dimensions as employee compensation, itemized deductions, the realization of incomes, tax compliance, and the like. See Feldstein (1995) for a detailed discussion.

<sup>10</sup> Joel Slemrod, “Methodological Issues in Measuring and Interpreting Taxable Income Elasticities,” *National Tax Journal* 51, No. 4 (1998): 773-788; and Robert Triest, “Econometric Issues in Estimating the Behavioral Response

Consequently, despite the many important insights from this work, several questions remain unresolved about reporting responses, and the events surrounding TRA86 remain a useful arena to examine these responses, especially using alternative data and methods.

In particular, do the estimated reporting decisions of individuals in response to the tax changes in TRA86 differ across the various forms of income that individuals receive and report? Do these estimated responses differ at different points in the distribution of income? Are these estimated responses sensitive to the specific estimation method, especially to methods that treat outliers in different ways? Do these estimated responses depend upon methods that adjust the data for any underlying but non-tax-related changes in income that occurred over this period?

In this paper we present new estimates of the responsiveness of individuals to tax changes that address these (and other) questions. We start with cross-sectional, microlevel information from the 1984 and 1989 Statistics of Income of the Internal Revenue Service (IRS). We adjust these data for non-tax-related income growth that occurred in the 1980s. We also use measures of the marginal tax rate that incorporate both federal and state income taxes. We then apply several different estimation techniques in order to estimate the responses of individuals in their reporting of different types of income (e.g., total or “comprehensive” income, adjusted gross income, wages and salaries) to the changes in federal and state income taxes reflected in TRA86.

Our results clearly indicate that TRA86 mattered in the income reporting decisions of most individuals, with reported (federal plus state) income-tax price elasticities that generally cluster between 0.3 and 0.7. However, our results also show that the estimated responses of individuals to taxes matter in different ways for individuals with different levels of income, in



ways that depend upon the types of incomes received by taxpayers, and in ways that are sensitive to estimation approaches and to adjustments for income distribution changes. These various differences have significant implications for the revenue costs associated with tax changes.

The next section briefly discusses TRA86. Data and methods are presented in section 3, and results are considered in section 4. Summary and conclusions are in section 5.

## THE TAX REFORM ACT OF 1986

The Tax Reform Act of 1986 (TRA86) was arguably the most comprehensive federal income tax reform in the last fifty years. Its basic features are well known. First, it sharply reduced marginal tax rates on nearly all taxpayers. The top individual income tax rate was reduced from 50 percent to 28 percent, and marginal tax rates for other brackets were also substantially reduced. In total, overall the average marginal tax rate for individuals fell by an average of 7 percent on a return-weighted basis. Second, TRA86 changed a number of features in the definition of income, most of which had the effect of greatly expanding the tax base. For example, eligibility for tax savings from individual retirement accounts was restricted, and various itemized deductions (e.g., medical expenses, interest expenses, state and local sales taxes) were also limited. In addition, preferential tax treatment of realized capital gains was eliminated, and the ability to use passive investment losses as an offset to other forms of income was sharply curtailed. The standard deduction and personal exemptions were also increased.

In part because of changes in the federal income tax, many states also altered their state income taxes (Courant and Gramlich, 1993).<sup>11</sup> Among states that relied heavily on the definition

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<sup>11</sup> Paul N. Courant and Edward M. Gramlich, "The Impact of the Tax Reform Act of 1986 on State and Local Fiscal

of the income tax base in the federal income tax, a typical state action was to reduce marginal tax rates in the state individual income tax, in order to avoid a major income tax increase on state citizens. For a similar reason, another common action was to modify in some way the federal base definition. Some states changed neither their rates nor their definition of the tax base, which led to a significant increase in state income taxes.

The intent of TRA86 was, at least in part, to encourage individuals (and firms) to devote more of their efforts to productive activities. The reduction in marginal tax rates allowed individuals to keep more of each dollar of earned income, and reduced incentives to engage in activities whose only purpose is to save taxes. The expansion of the tax base reduced their ability to engage in tax shelter and arbitrage activities. However, the actual magnitudes of the individual responses to these massive federal and state changes in the income remain controversial. The next section discusses our methodology for estimating these responses.

## **DATA, “ADJUSTMENTS”, AND ESTIMATION METHODS**

### *Data*

Our analyses are based upon the 1984 and 1989 Individual Tax Model Files (ITMFs) from the Statistics of Income of the Internal Revenue Service (IRS). These ITMFs are cross-sectional, microlevel data sets that contain detailed information on individual observations from a stratified random sample of U.S. taxpayers; for more detailed information on these data sets, see the Internal Revenue Service (1984, 1989).<sup>12</sup> The 1984 ITMF contains 79,556 individual

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Behavior,” in *Do Taxes Matter? The Impact of the Tax Reform Act of 1986*, Joel Slemrod (ed.) (Cambridge, MA: The MIT Press, 1992, 243-275).

<sup>12</sup> Internal Revenue Service, Statistics of Income, *Individual Public-Use Microdata File* (Washington, D.C., 1984);

records drawn from a population total of approximately 110 million tax return records, and the 1989 file contains 96,588 records from a population of 112 million records; in both years high-income tax returns are significantly oversampled, so that these ITMFs contain perhaps the most detailed and comprehensive information available for high-income taxpayers.<sup>13</sup> Each file contains roughly 200 variables that represent information coded from actual federal individual income tax returns. The taxpayer name, social security number, and other identifying information (other than the primary state of residence) are excluded from the file. We include returns filed by married couples filing jointly and separately and those filed by single individuals, and exclude returns filed by heads of households and by dependents.<sup>14</sup>

These ITMFs contain detailed information on taxpayer federal individual income tax reporting decisions two years prior to the enactment of TRA86 and one year after TRA86 was fully phased in. They therefore represent taxpayer behavior before individuals began to change their behavior in anticipation of the reform and after they had sufficient time to adapt to its various provisions. We also incorporate state income tax systems (where relevant) in order to

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and Internal Revenue Service, Statistics of Income, *Individual Public-Use Microdata File* (Washington, D.C., 1989).

<sup>13</sup> For example, the 1989 ITMF contains 28,042 returns for taxpayers with income above \$200,000, or 29.0 percent of the total sample of 96,588 returns and 3.6 percent of the estimated high-income population of 789,803 returns.

<sup>14</sup> We exclude dependent returns because of the significant change in tax treatment of such returns between 1984 and 1989, and we exclude head of household returns because of the relatively small sample size in upper deciles.

estimate behavioral responses to combined federal plus state marginal tax rates.<sup>15</sup>

There are several advantages of using the ITMFs to estimate taxpayer responses to tax changes. The ITMFs have incredibly rich information on items reported on the tax returns. In addition, the ITMFs contain very large numbers of observations on individuals at all points in the income distribution, especially at higher income levels.

However, there are several problems with these data, especially relative to panel data sets. One limitation of the ITMFs is the relative lack of demographic information. Although the ITMFs contain virtually all reported tax items, the tax returns contain little information on individual characteristics. Nevertheless, we are able to extract a limited amount of demographic information from items reported on the returns. For example, we infer the age of an individual based on their use of the elderly exemption and the number of children from the child exemptions claimed on the return.

Another, more significant, limitation of the ITMFs is that each is a cross-section of different individuals at a point in time, so that the same individuals are not included in each of the two years. As pointed out by Navratil (1995) and others, the distribution of income is not

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<sup>15</sup> In order to calculate the combined federal and state marginal tax rate for each taxpayer and each year for use in estimating reporting-tax price elasticities, we supplement the information on federal taxes with information on the state individual income tax regimes in each state (where relevant), using detailed state tax calculators for the two years. The state identifier is not available for high-income individuals (or those with AGI over \$200,000). To assign state identifiers for these individuals, we first create two groups of high-income returns. One group consists of all high-income returns in the ITMF for which state and local income tax deductions are less than 15 percent of the average deduction for all high-income returns (“no income tax” group) and a second group of all other high-income returns (“other” group). We then randomly sample the appropriate group at a rate equal to the percent of high-income returns reported by the IRS in each state for that year. For example, California has 16.8 percent of the high-income returns in 1989; accordingly, we randomly sample 16.8 percent of the “other” high-income group in the 1989 ITMF, and assign these returns to California. We repeat the same procedure for each state. As a check on this procedure, we calculate the resulting total AGI by state, and then compare our estimate with that reported by the IRS. In nearly all states, the difference between our estimate and the IRS number is less than five percent; in those cases where the difference exceeds five percent, we resample the high-income returns until we obtain a sample high-income AGI within five percent of reported high-income AGI.

constant, and can change for a number of non-tax reasons; relatedly, income growth in the different deciles is unlikely to be the same (Piketty and Saez, 2003).<sup>16</sup> The use of cross-sections of taxpayers will attribute any changes in the underlying distribution to tax rate changes even if the true causes are non-tax-related. It is partly because of this concern that Feldstein (1995), Auten and Carroll (1999), Gruber and Saez (2002), Giertz (2007), and Heim (2009), among others, use panel data.

However, panel data are not without their own problems. Of perhaps most importance, panel data (like cross-section data) are not immune from the necessity of controlling for any underlying changes in income that are not tax-related, such as a mean-reverting component to income in any given year.<sup>17</sup> In this regard, we have explored several methods that attempt to control for underlying trends in the distribution of income by adjusting the 1984 and 1989 cross-sections for secular changes in the distribution, with largely similar results, and we discuss these methods later. Also, we have examined various aspects of the individuals in the two years, and their characteristics in such dimensions as proportions that are elderly or married are generally similar over time.<sup>18</sup>

For each of the two years, we select from each return the levels of reported wages and salaries, interest income, dividend income, capital gains income, and adjusted gross income (AGI). We also calculate a measure of total (or “comprehensive”) income, as the sum of AGI,

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<sup>16</sup> Thomas Piketty and Emmanuel Saez, “Income Inequality in the United States, 1913–1998,” *The Quarterly Journal of Economics* 118, No. 1 (2003): 1-39.

<sup>17</sup> If there is mean-reversion, then a higher income taxpayer in one year will tend to become a lower income taxpayer in the next year, and this change in reported income will be incorrectly attributed to marginal tax rate changes.

<sup>18</sup> Note that in other work we have examined the reporting responses of taxpayers using different years as the basis of comparison (e.g., 1992 versus 1995). See: James Alm and Sally Wallace, “Are the Rich Different?” in *Does Atlas Shrug? The Economic Consequences of Taxing the Rich*, Joel Slemrod (ed.) (New York, NY: Cambridge University Press, 2000, 165-187).

social security income not included in AGI, dividends not reported in AGI, pension income not reported in AGI, and capital gains not reported in AGI, retirement contributions, and self-employed health insurance deductions. This definition of total income captures as much of an individual's income as can be measured using tax return information, and also gives a consistent definition of total income over time.<sup>19</sup> Our intent is to compare the levels of these various types of income that individuals report in 1984 and in 1989, holding constant as many factors as possible that might affect the amounts of reported incomes. To do this, we must consider secular trends in nominal per capita income, pre- and post-TRA86, as well as any purely structural changes in the definition of the income tax base. These adjustments are discussed in more detail later.

Table 1 contains summary information on the mean levels of income types by total income class for 1984 and 1989, holding prices constant at 1989 levels, where the 1<sup>st</sup> decile represents the poorest 10 percent of the population as measured by total income. For the full sample, the levels of mean income for each income type increased over this period, other than for capital gains income. However, this overall increase was very unevenly distributed across income deciles, and occurred largely because of increases in mean income levels at the top income levels. For example, mean total income for each of the bottom nine deciles remained roughly constant from 1984 to 1989; only for the 10<sup>th</sup> decile did mean total income increase, by 6.5 percent, driven largely by an increase in wages and salaries and interest income. Mean income levels from interest and dividend incomes changed erratically for most deciles, although

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<sup>19</sup> Note that total income does not include such items as nonretirement transfer payments, fringe benefits, unrealized capital gains, and underreported income, items about which there is no information on the individual tax return; it also does not include income that is mistakenly or purposely underreported or that is not reported at all on returns.

the average amounts of these income types increased for the full sample. Capital gains income exhibited a slightly downward trend for most deciles, and fell significantly for the top deciles.<sup>20</sup> These changes in income are consistent with other evidence on distributional changes over this period.<sup>21</sup>

[Table 1 about here]

As for the shares of income, calculated as the share of each income type relative to total income, these shares changed somewhat unevenly for many of the deciles even over this short period. For example, the share of wages and salaries in total income fell from 74.5 percent (or \$22,691/\$30,460) in 1984 to 70.4 percent in 1989 for the full sample, and generally fell for the bottom nine deciles. However, the share of wages and salaries in total income rose slightly for the 10<sup>th</sup> income decile (from 58.9 percent to 59.1 percent), and rose even more for the top 5 percent (50.0 percent to 52.0 percent) and the top 1 percent (33.8 percent to 39.8 percent) of individuals. Interest income also tended to decline as a share of total income for most lower

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<sup>20</sup> It should be noted that capital gains income for the bottom decile is generally higher than for the next four or five income deciles. This occurs largely because some otherwise low-income individuals (e.g., the elderly) received large amounts of capital gains income from the sale of assets. Similarly, many individuals in the bottom decile receive relatively large amounts of income from interest and dividend income.

<sup>21</sup> For discussions of the overall distributional changes in the last several decades in the United States, see: Frank Levy and Richard J. Murnane, "U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations," *The Journal of Economic Literature* 30, No. 3 (1992): 1333-1381; Dimitri B. Papadimitriou and Edward N. Wolff (eds.), *Poverty and Prosperity in the USA at the End of the Twentieth Century* (New York, NY: St. Martin's Press, 1991); Sheldon Danziger and Peter Gottschalk, *American Unequal* (Cambridge, MA: Harvard University Press, 1995); and Peter Gottschalk and Timothy M. Smeeding, "Cross-National Comparisons of Earnings and Income Inequality," *The Journal of Economic Literature* 35, No. 2 (1997): 633-687. For discussions that emphasize the impacts of taxes, see also: Daniel R. Feenberg and James M. Poterba, "Income Inequality and the Incomes of Very High Income Taxpayers," in *Tax Policy and the Economy*, James M. Poterba (ed.) (Boston, MA: The MIT Press, 1993, 145-177); and Emmanuel Saez, "Reported Incomes and Marginal Tax Rates, 1960-2000: Evidence and Policy Implications," in *Tax Policy and the Economy, Volume 18*, James M. Poterba (ed.) (Boston, MA: National Bureau of Economic Research, 2004, 117-174). For some international experiences, see: Chiaki Moriguchi and Emmanuel Saez, "The Evolution of Income Concentration in Japan, 1885-2005: Evidence from Income Tax Statistics", *The Review of Economics and Statistics* 90, No. 4 (2008):713-734; Facundo Alvaredo and Emmanuel Saez, "Income and Wealth Concentration in Spain in a Historical and Fiscal Perspective", *Journal of the European Economic Association* 7, No. 5 (2009):1140-1167.

income deciles, but trended slightly upward for the full sample, driven again by changes in the 10<sup>th</sup> income decile. It is of some note that the ratio of AGI to total income increased for all income deciles (other than the 1<sup>st</sup> decile), and increased most for the top 5 percent (from 78.5 percent to 95.0 percent) and the top 1 percent (from 69.4 percent to 93.9 percent). This change is consistent with the base-broadening measures in TRA86. Table 1 also shows the average marginal tax rates (federal plus state) by total income class, calculated as a simple arithmetic average of the simulated marginal tax rates in each class. Overall, federal and state income tax changes resulted in a slight reduction in the average marginal tax rate, from 21.95 to 20.37 percent for the full sample. The largest absolute and percentage reductions occurred for higher total income classes.

We use these files to estimate the responses of individuals in their reporting behavior to changes in the federal and state individual income taxation arising from TRA86. We estimate the responses of individuals in their reporting decisions, focusing upon the impact of TRA86 on wages and salaries, AGI, and total income.

It should be emphasized that this reporting response is likely to vary for individuals at different levels of income and with different forms of income. As noted above, the magnitude of the change in incentives faced by high income individuals is significantly different than that faced by lower income individuals. Also, the ability to vary the reporting of wages and salaries is not likely to be the same as that for AGI or total income. The next subsection discusses our empirical approach to measuring these varied and differential responses.

### *“Adjustments”*



Our intent is to compare the levels of the various types of income that individuals report in 1984 and in 1989, holding constant as many factors as possible that might affect the amounts of reported incomes. To do this, we must apply a consistent definition of income over time in order to control for any purely structural changes in the definition of the income tax base, and our measures of income employ a constant definition of income. For example, for dividend and capital gains incomes we add back the portion of each that is not included in AGI so that our measure represents the true level of each income type actually received. Of more importance, like all others who examine taxpayer responses, we must also control for any underlying changes in income that are non-tax-related. This requires us to consider secular trends in nominal income, pre- and post-TRA86, in order to adjust all nominal components in 1989 reported income so as to control for non-tax-related factors that affected income over the 1984 to 1989 period.

To make these “adjustments”, we explore several alternative methods. The one that we emphasize and report here is as follows.

We calculate, by income quintile and by income type, the actual average income reported for each year over the 1982 to 1989 period, using the sample of individual income tax returns from the IRS Statistics of Income.<sup>22</sup> For each type of income (e.g., wages, AGI, and comprehensive income), we have five observations (or one for each quintile) for each of the eight years, for a total of 40 observations for each income type. We deflate these income levels to 1984 levels. We then estimate three separate equations, one for each income type, to predict the real level of income by quintile. Each equation is an OLS regression of the real reported level of

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<sup>22</sup> 1982 and 1983 were selected to increase the number of observations used for the adjustment. We also performed

income by type, as a function of real gross domestic product, the unemployment rate, four dummy variables for the income quintiles, and a time trend. The results of the estimation are used to calculate the predicted values of real income by type and by income quintile by year. In these predicted levels of income, we believe we have controlled for the overall changes in the economy (e.g., gross domestic product, unemployment, and general trends in income growth).<sup>23</sup> Finally, we calculate the difference between the predicted real value of income in 1989 and the actual (or unadjusted) 1989 reported real value by quintile, and we then adjust the 1989 real levels by the difference. For example, the predicted real wage income for the lowest quintile for 1989 is \$2,432 and the real reported level is \$2,036. Therefore, for every observation in the first quintile in our data set for 1989, we adjust real wage income upwards by 19.4 percent. We repeat

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the same adjustments using the Current Population Survey, and found similar results.

<sup>23</sup> To illustrate, the unadjusted distribution of real wages by year from the panel data file is:

Real Wage Income	1982	1983	1984	1985	1986	1987	1988	1989
Quintile 1	2432	2153	2373	2522	2318	2440	2551	2036
Quintile 2	6701	6026	6662	6962	6792	7257	7296	6461
Quintile 3	12496	11899	11973	12427	12424	12631	12584	12289
Quintile 4	20996	20308	19149	21138	20545	21068	21032	20200
Quintile 5	40225	39178	39604	40207	39214	42615	40172	40593

Our estimated equation is:

$$W_t = 84366 + 1.63*(RealGDP_t) + 5.64*(UnemploymentRate_t) - 37872*D1 - 33456*D2 - 27885*D3 - 19671*D4 - 409.2*Year \quad (R^2=0.99),$$

where  $t = 1982, \dots, 1989$ ,  $RealGDP_t$  is real GDP in year  $t$ ,  $UnemploymentRate_t$  is the unemployment rate in year  $t$ ,  $D_i$  is a dummy variable equal to 1 for quintile  $i$  and 0 otherwise ( $i = 1, \dots, 4$ , with the fifth quintile the omitted category), and  $Trend$  is a time trend. The predicted values of real wage income are:

Predicted Real Wage Income	1982	1983	1984	1985	1986	1987	1988	1989
Quintile 1	2107	1995	2124	2654	2564	2475	2477	2432
Quintile 2	6523	6412	6540	7069	6980	6891	6893	6848
Quintile 3	12094	11983	12111	12641	12551	12462	12464	12419
Quintile 4	20308	20195	20324	20854	20765	20676	20678	20633
Quintile 5	39979	39868	39996	40526	40437	40347	40350	40304

For example, in 1983 (arguably one of the more stable years during this period in terms of tax changes) our income adjustment model predicts an average real wage in quintile 1 of \$1995, while the actual real wage was \$2153, for a difference of 7.3 percent; the difference between the predicted and actual real wages for quintiles 2 through 5 in 1983 is between -6.0 to 0.5 percent. In 1984, the difference for quintiles 2 to 5 is between -6.1 and 1.8 percent, while the lowest quintile is different by 10.5 percent.

this exercise for each type of income. It is these adjustments that attempt to control for non-tax-related factors that could influence our estimates. With these adjustments, any remaining differences in the adjusted 1989 values are, we believe, more likely attributable to the changes in tax law than are the original unadjusted values.<sup>24</sup>

It should be noted that our adjustments are still subject to some limitations. In estimating these regressions, we of course leave out the potential impact of tax rates, which are likely correlated with some of our explanatory variables; that is, in attempting to net out non-tax factors, we are likely netting out at least some of the tax effects. This factor suggests that any estimated reporting responses are likely to underestimate the “true” response. An additional problem is that the quintiles do not contain the same group of individuals over time; with income mobility there may be some movement between quintiles, which is one of the main reasons for using panel data. As an extreme example, someone who was in, say, the lowest quintile in 1982-1983 and in the top quintile in 1988-1989 would have the growth rate of the top quintile imputed to him or her when deflating the 1989 income, when actual income growth was much greater; again, this factor suggests that our estimated reporting response is likely to underestimate the “true” response. Finally, our approach assumes that income growth within quintiles has been constant; the work of Piketty and Saez (2003) and others demonstrates that it is unlikely that is the case.

However, it should also be noted that we tried various other “adjustments” to control for non-tax related changes over the period. For example, we used the average annual growth rates from the predicted values (as described above) for the period 1984 to 1989 to adjust reported

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<sup>24</sup> We are grateful to several anonymous referees for helping us clarify our thinking about these limitations.

income items. In another adjustment method, we calculated, by income quintile and by income type, the growth in incomes for all non-tax-reform years in the 1980s (e.g., omitting the years 1980-1981, 1981-1982, 1984-1985, 1985-1986, and 1986-1987 because of the Reagan tax changes and TRA86, and including the years 1982-1983, 1983-1984, 1987-1988, and 1988-1989); we also performed the same growth calculations with different variants on the years included for the growth estimates (e.g., omitting 1987 and 1988 because of the phase-in of TRA86), with no appreciable effect on our final results. We used the calculated income growth in these years to obtain average rates of “non-tax-related” income growth for the 1984 to 1989 period, and we then deflated our 1989 income data to 1984 levels by these average growth rates, applying different deflators both by type of income and by income group. In general, our results were robust to these alternative adjustments.

### *Estimation Methods*

We apply a variety of estimation methods to our adjusted data, in order to identify reporting behavior. The simplest method is OLS estimation. The basic OLS specification for each form of reporting behavior starts as:

$$Y = \beta X + \varepsilon, \tag{1}$$

where  $Y$  is some form of reported income (e.g., wages and salaries),  $\beta$  is a vector of parameters (including a constant),  $X$  is a vector of individual characteristics, and  $\varepsilon$  is an error term. By estimating separate equations for the entire sample of returns for each income type, we are able to measure differential responses across the various forms of income.

Individual characteristics include: a dummy variable for *Marital Status*, equal to 1 if

married and 0 otherwise; the number of *Children*, as reported via dependent exemptions; a dummy variable for the receipt of *Unemployment* compensation, equal to 1 if unemployment compensation is reported and 0 otherwise; and a dummy variable for *Elderly* status, equal to 1 if the elderly deduction is claimed and 0 otherwise.

It seems likely, however, that individual responses will differ at different points in the distribution of income. We use two approaches to measure differential responses. The first is estimation of equation (1) and its variants for each of the five separate quintiles of the entire sample, rather than for the entire sample itself. To do this, we rank all individuals in each year's ITMF on the basis of total income, and then estimate separate forms of equation (1) for each 20 percent subsample grouping and each income type.

A second and more novel approach to estimating differential taxpayer responses is quantile regression (Koenker and Basset, 1978; Koenker and Hallock, 2001).<sup>25</sup> Unlike OLS estimation for the entire sample, which generates a single vector of estimated coefficients, quantile regression generates a different coefficient vector for each quantile. Also unlike OLS estimation, which minimizes the sum of the squared residuals, quantile regression minimizes the sum of the absolute residuals and thereby reduces the influence of outliers. Although outliers obviously exist in any data source, in tax return data they occur frequently and they can be large.

As an example of the interpretation of quantile results, consider the SOI sample that we have, and rank all individuals from lowest to highest in their reporting of, say, wages and

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<sup>25</sup> Roger W. Koenker and Gilbert Basset, "Regression Quantiles," *Econometrica* 46, No. 1 (1978): 43-61; and Roger W. Koenker and Kevin F. Hallock, "Quantile Regression," *The Journal of Economic Perspectives* 15, No. 4 (2001): 143-156. See also: Moshe Buchinsky, "A Monte-Carlo Study of the Asymptotic Covariance Matrix Estimators for the Quantile Regression Estimators," in *Theory and Practice of Quantile Regression*, Ph.D. Dissertation (Cambridge, MA: Harvard University, 1991); and Moshe Buchinsky, "Changes in the U.S. Wage Structure, 1963-1987: Application of Quantile Regression," *Econometrica* 61, No. 4 (1994): 405-458.

salaries. Now suppose that wages and salaries are a linear function of, say, the number of children. If we specify the 50th quantile, then the slope parameter for *Children* generated from quantile regression for the 50th quantile shows the change in the median value of wage income (conditional upon children) for a change in the number of children. More generally, the slope coefficient for any given quantile shows how the wage quantile (conditional upon the number of children) changes as the number of children changes. Put differently, for every possible number of children ( $X$ ), there is an observed conditional distribution of wages and salaries ( $Y \mid X$ ). These conditional distributions have means and quantiles. Coefficients of a mean regression are estimates of the marginal effect of  $X$  on the conditional mean of  $Y$ ; in contrast, coefficients of a quantile regression are estimates of the marginal effect of  $X$  on the conditional quantile of  $Y$ .

Note that the quantile ranking for wages and salaries is based only upon wages and salaries, not on total income. Consequently, the same individuals are not necessarily in the same quantiles when we estimate the separate equations for wages and salaries, interest income, dividend income, capital gains income, AGI, and total income.

In OLS regressions with the full sample, the OLS subsample quintile regressions, and the quantile regressions, we apply a difference-in-difference estimation approach. TRA86 constituted a significant break from previous tax policy. If we can control for the major influences on reporting behavior that reflect such things as the growth in income over time, changes in the definition of the tax base, and other factors as discussed later, then any differences in reported incomes that we observe between 1984 and 1989 will be largely due to modifications in individual behavior in response to TRA86. More precisely, suppose that TRA86 affects one group of taxpayers (the treatment group) but not another group (the control group). If we

measure the change over time in the response of each group (the group difference), then the time difference between these group responses is the “difference-in-difference” estimate of the impact of TRA86.

It should be noted that the use of this approach is not without some difficulties. As emphasized by Heckman (1996) and Bertrand, Duflo, and Mullainathan (2004), the approach assumes (among other things) that the experiment affected only the treatment group and that other events over the period affected both groups equally.<sup>26</sup> However, we believe that we are able to control sufficiently for these other events in our various estimations. Our controls are based on several factors. Recall that we adjust our 1989 income levels for non-tax-related changes that occurred during the 1980s.<sup>27</sup> Recall also that we adjust all reported items by any purely structural changes in the definition of the income tax base over this period (e.g., a constant income definition), and that we include a number of individual control variables as explanatory variables in our estimations.

Finally, we also include in our estimations several variables to achieve identification of the effects of TRA86. We explore three potential sources of identification. The most obvious source is the time-specific factor, or pre- versus post-TRA86. The time-specific element is measured by a dummy variable *TRA*, equal to 1 for observations after TRA86 and 0 otherwise.

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<sup>26</sup> James J. Heckman, “Comment,” in *Empirical Foundations of Household Taxation*, Martin Feldstein and James M. Poterba (eds.) (Chicago, IL: National Bureau of Economic Research and the University of Chicago Press, 1996, 32-38); Marianne Bertrand, Esther Duflo, and Sendhil Mullainathan, “How Much Should We Trust Differences-in-differences Estimates?” *Quarterly Journal of Economics* 119, No. 1 (2004): 149-275.

<sup>27</sup> For a discussion of the impact of underlying changes in the distribution of income on difference-in-difference estimates, see: Austan Goolsbee, “What Happens When You Tax the Rich? Evidence from Executive Compensation,” *The Journal of Political Economy* 108, No. 2 (2000a): 352-378; and Austan Goolsbee, “It’s Not About the Money: Why Natural Experiments Don’t Work on the Rich,” in *Does Atlas Shrug? The Economic Consequences of Taxing the Rich*, Joel Slemrod (ed.) (New York, NY: Cambridge University Press, 2000b, 141-158); and Brian J. Hall and Jeffrey B. Liebman, “The Taxation of Executive Compensation,” *Tax Policy and the*

A second source is individual-specific, for individuals who are high income versus those who are low income. We use here a dummy variable *HighIndividualIncome*, equal to 1 for individuals who are in the 75th percentile or above of total income, and 0 otherwise; this variable also allows us to examine differential responses by income class. Our third source of identification is a state-specific factor, which looks for differences in behavior between those who live in high-tax states versus those in low-tax states. This variable is called *HighStateTax*, and equals 1 for individuals living in a state whose ratio of taxes to personal income exceeds the 75th percentile of all states, and 0 otherwise.

These variables are introduced as separate dummy variables and as interacted variables. Note that we have also estimated variants with different individual and state sources of identification, particularly different percentile cut-offs for *HighIndividualIncome* or for *HighStateTax* (e.g., 60<sup>th</sup>, 80<sup>th</sup>, and 90<sup>th</sup> percentile). Our results are largely unaffected.

This discussion suggests that we estimate variants on equation (1). If the only source of identification is time-specific (or *TRA*), then we estimate

$$Y = \beta X + \varphi_1 TRA + \varepsilon, \quad (2)$$

where  $Y$ ,  $X$ ,  $\beta$ , and  $\varepsilon$  are defined as in equation (1). The coefficient on *TRA*, or  $\varphi_1$ , represents the difference estimator for the effects of tax reform on reporting behavior, and measures the difference in reporting of, say, wages and salaries before versus after the enactment of TRA86.

Other sources of identification are introduced by adding additional dummies and interactions.

For example, if time-, individual-, and state-specific differences are all included, we estimate

$$Y = \beta X + \varphi_1 TRA + \varphi_2 HighIndividualIncome + \varphi_3 HighStateTax \\ + \varphi_4 TRA * HighIndividualIncome + \varphi_5 TRA * HighStateTax$$



$$\begin{aligned}
& + \varphi_6 \textit{HighIndividualIncome} * \textit{HighStateTax} \\
& + \varphi_7 \textit{TRA} * \textit{HighIndividualIncome} * \textit{HighStateTax} + \varepsilon.
\end{aligned} \tag{3}$$

The coefficient  $\varphi_7$  on  $[\textit{TRA} * \textit{HighIndividualIncome} * \textit{HighStateTax}]$  is the difference-in-difference estimator for the effects of tax reform on reporting behavior. It equals the change in individual reporting of wages and salaries among high-income (relative to low-income) individuals in high-tax (relative to low-tax) states after (relative to before) TRA86.

We apply the difference-in-difference approach to OLS estimation for the entire sample, to OLS estimation for the separate total income quintile subsamples, and to quantile regression; in the quintile subsamples estimation, we necessarily do not include the *HighIndividualIncome* source of identification. It should also be noted that we have estimated a very wide range of other specifications using our adjusted data. We have used the shares of the income types as the dependent variables. We have changed the basic specification by including some additional variables that reflect some potentially relevant individual circumstances, such as whether the individual itemizes deductions on the federal tax return, whether the individual reports income from a business or a profession operated as a sole proprietor on Schedule C, and whether the individual receives income from rental real estate, royalties, partnerships, S corporations, estates, and trusts (Schedule E). We have also estimated all specifications using both unweighted and weighted ITMF data. (As noted above, we also applied different methods of adjustment to the data, in an attempt to control for non-tax-related factors that could influence reporting behavior.)

All results are available upon request.<sup>28</sup>

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<sup>28</sup> In other work (Alm and Wallace, 2000), we have examined the reporting responses of the very rich, defined as individuals in the top 0.5 or the top 1 percent of the total income distribution. Note that Goolsbee (2000a, 2000b) presents evidence that the behavioral responses of the very rich were likely due mainly to timing responses; the results of Hall and Liebman (2000) are inconclusive.

## ANALYSIS AND RESULTS

Some representative estimation results are presented in Table 2 for wages and salaries, Table 3 for AGI, and Table 4 for total income.<sup>29</sup> For ease of comparison, only the results with *TRA* (or equation (2)) are reported in Tables 2 to 4. The elasticities of the relevant reporting decision with respect to the net-of-tax rate are summarized in Table 5 for all specifications of wages and salaries, AGI, and total income.<sup>30</sup>

[Table 2 about here]

Consider first the results for wages and salaries, in Table 2. For the OLS full sample estimation, tax reform has a large, significant, and positive impact on the reporting decision. However, the results from the OLS subsample quintiles suggest that this result is due mainly to responsiveness at the upper end of the income distribution, since the coefficient on *TRA*, or  $\phi_1$ , tends to increase for the upper quintiles, and is largest for the top 20 percent quintile. The quantile regression estimates also suggest that higher income individuals are more responsive to tax reform, at least in absolute terms, as shown by the increase in the absolute size of  $\phi_1$  for

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<sup>29</sup> We have estimated similar specifications for the various types of capital income (interest, dividend, and capital gains income), but these estimations generally perform erratically, in part because of the concentration of capital income in a small number of taxpayers and also because of the special treatment of capital income in the tax code. These results are not reported.

<sup>30</sup> For example, the tax-price elasticity based upon equation (2), in which only the *TRA* variable is included, is calculated as:

$$\frac{[\ln(Y_{1989}) - \ln(Y_{1984})]}{[\ln(1 - MTR_{1989}) - \ln(1 - MTR_{1984})]},$$

where  $Y$  is some type of reported income and  $MTR$  is the combined federal-state marginal tax rate, with both indexed by the year. Similarly, with *TRA* and *HighIndividualIncome* the elasticity is calculated as:

$$\frac{[(\ln(Y_{1989, Highincome}) - \ln(Y_{1989, Lowincome})) - (\ln(Y_{1984, Highincome}) - \ln(Y_{1984, Lowincome}))]}{[\ln(1 - MTR_{1989, Highincome}) - \ln(1 - MTR_{1989, Lowincome}) - (\ln(1 - MTR_{1984, Highincome}) - \ln(1 - MTR_{1984, Lowincome}))]},$$

where  $Y_{1989, Highincome}$  is some type of reported income for high-income taxpayers in 1989, and so on. Other elasticities are calculated in a comparable manner.

higher quantiles.<sup>31</sup> Recall, however, that the quantile ranking for wages and salaries is based only upon wage income, while the OLS subsample quintiles are determined by total income.

A similar, and even clearer, pattern is shown in Table 3 for AGI. As with wages and salaries, the impact of tax reform on the reporting of AGI is large, positive, and significant for the full OLS sample. However, the OLS subsample quintiles clearly indicate that the positive effect of *TRA* is due largely to the extreme responsiveness of the top quintiles. The same pattern is found in the quantile estimates, where the coefficient on *TRA* is always significant and increases in size as the choice of the quantile increases from .2 to .8. The estimation results for total income (Table 4) are similar if not as striking.

[Table 3 about here]

[Table 4 about here]

When all combinations of identifying variables are estimated (where appropriate) using the OLS full sample, the OLS subsample quintiles, and the quantile regressions, *TRA* is found to have a consistently positive impact on the reporting decision of most types of income. The various reporting-tax price elasticity estimates are given in Table 5 for all income types. There is a some tendency for the wage elasticities to be smaller than those for AGI and total income, implying that individuals have somewhat less ability to change their reporting of wages than of other types of income, but this tendency is not pronounced. Also, there is a stronger tendency for the elasticities to increase both for higher income subsample quintiles and for higher income quantiles. This latter result is consistent with the notion that individuals with higher levels of

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<sup>31</sup> The standard errors in the quantile regressions are boot-strapped standard errors. Although consistency of bootstrap estimators has not been proven theoretically, Buchinsky (1995) uses Monte-Carlo evidence to suggest the consistency of the estimates. See: Moshe Buchinsky, "Estimating the Asymptotic Covariance Matrix for Quantile

income have more flexibility in their reporting decisions.<sup>32</sup>

[Table 5 about here]

Overall, the elasticities are consistently positive for most income types, with many of them clustered roughly between 0.3 and 0.7, a range that makes them comparable in size and sign to those calculated by Gruber and Saez (2002), though somewhat smaller than those in Feldstein (1995) and Auten and Carroll (1999).

However, there is significant variation in the tax price elasticities, especially across estimation method. For example, elasticities from the OLS subsamples quintiles are often insignificant and sometimes quite small, while the quantile elasticities are nearly always positive and generally larger.

It is also important to note that the estimated responses are somewhat affected by adjustments to the data that attempt to capture any underlying but non-tax-related changes in income that occurred over this period. Recall that we generated the estimation results in Tables 2 to 4 by adjusting all nominal amounts of 1989 reported incomes by the predicted rate of growth of these incomes over the period of the 1980s. Suppose, however, that we compare the impact of *TRA* on wages and salaries, AGI, and total income, when we use the original unadjusted data (or data without any adjustment for income growth over the period) versus the adjusted data (as in Tables 2 to 4). Table 6 reports only the coefficient on *TRA* for these alternative estimations, where the coefficients for the adjusted data are identical to the earlier estimates. We see that the estimated impact of *TRA* varies significantly across the various estimations, sometimes larger with the adjusted data and sometimes smaller. In general, however, it is evident that the failure

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Regression Models: A Monte Carlo Study,” *Journal of Econometrics* 68, No. 3 (1995): 303-338.

to consider non-tax-related factors would tend to generate different estimates of the impact of tax reform on the reporting decision.

[Table 6 about here]

The signs on the control variables are generally consistent with expectations. With some occasional exceptions, married individuals, couples with children, and individuals who itemize tend to have higher forms of all reported incomes. In contrast, individuals who receive unemployment compensation typically have lower reported incomes of all types. Not surprisingly, the elderly dummy variable has a negative impact on the reporting of wages and salaries, an impact that does not vary much with income class in the quantile results; however, for other income types, *Elderly* sometimes has a significant and positive effect on reporting, especially for higher quintiles or quantiles and especially also for income from capital.

## CONCLUSIONS

There now seems little question that the Tax Reform Act of 1986 affected the reporting decisions of most individuals, and our estimation results point consistently to a significant increase in reported income in response to the lower marginal tax rates enacted under TRA86. However, our results also suggest that there are important differences in the estimated reporting responses across the various types of income, across income classes, across estimation methods, and across data adjustment methods. Taxpayer responses to marginal tax rates tend to be smaller for wages and salaries than for other forms of income in which individuals have more discretion in the timing of their receiving and report to be smaller for individuals with lower levels of

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<sup>32</sup> Gruber and Saez (2002) find a similar result. See also Saez (2004).

income because these individuals also have less flexibility in their decisions. Taxpayer responses also tend to be sensitive to the method of estimation (as well as to slight changes in relevant parameter values). Finally, taxpayer responses tend to be lower when the data are adjusted for non-tax-related factors that may have affected reporting behavior during the 1980s.

The ability of any tax increase to generate greater tax revenues depends critically on the magnitude of these estimated responses, in particular on the elasticity of the tax base with respect to the tax price of reported income. For a constant tax base, an increase in the tax rate will generate greater revenues in proportion to the increase in the tax rate. However, if the tax base elasticity is not zero, then a higher tax rate will also shrink the tax base; whether a higher tax rate generates higher tax revenues then depends upon the relative responses of the tax rate and the tax base. To illustrate this tradeoff, the revenue impacts of a constant ten percent change in the tax rate are shown in Table 7, under the assumption that the tax base  $B$  is a simple constant-elasticity function  $[A(1-t)^\eta]$ , where  $t$  is the tax rate,  $A$  is an arbitrary constant, and  $\eta$  is the elasticity of the tax base with respect to the tax price of reported income; revenues therefore equal  $tB$  or  $tA(1-t)^\eta$ .<sup>33</sup> As shown in Table 7, if the elasticity is 0, then a ten percent increase in the tax rate will always generate an equal ten percent increase in tax revenues, regardless of the level of the initial tax rate. However, the revenue-raising ability of a higher tax rate is significantly reduced for even a modest tax base elasticity. For example, when the tax base elasticity equals 0.4, increasing the tax rate by ten percent from its initial level of 50 percent will increase revenues by only 5.46 percent; a higher tax rate will actually reduce revenues once the initial tax rate exceeds

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<sup>33</sup> For example, when the initial tax rate is 30 percent, revenues are calculated for a tax rate of 30 percent, and are then calculated again for a higher tax rate of 33 percent. The difference is expressed in percentage terms relative to the initial level of revenues.

roughly 70 percent. Even more strikingly, if the tax base elasticity equals only 1.0, then revenues will begin to fall with a higher tax rate once the tax rate exceeds only  $1/2$ .

[Table 7 about here]

As emphasized earlier, there are good reasons for cautious interpretation of these, or any other, results. Even though we have attempted to control for non-tax-related factors that may have contributed to changes in reporting behavior, we must admit that it is still risky to attribute all of these changes in reporting directly to the changes in taxation represented by TRA86. Also, TRA86 changed a number of features of the income tax, not simply marginal tax rates, and the elasticity estimates necessarily attribute all impacts of the reform to changes in marginal tax rates. In sum, disentangling the effects of taxes is, and will likely remain, a difficult proposition.

## ACKNOWLEDGEMENTS

We have benefitted from helpful comments by several anonymous referees, the Editor, Brian Erard, Alan Plumlee, Chih-Chin Ho, and seminar and conference participants at Carleton University, Georgetown University, the United States Internal Revenue Service, Syracuse University, and the University of Colorado at Boulder.

TABLE 1  
MEAN LEVELS OF INCOME TYPES AND AVERAGE MARGINAL TAX RATES  
BY TOTAL INCOME CLASS, 1984 AND 1989

Total Income Class	Wages and Salaries		Interest Income		Dividend Income		Capital Gains Income		AGI		Total Income		Average Marginal Tax Rate	
	1984	1989	1984	1989	1984	1989	1984	1989	1984	1989	1984	1989	1984	1989
1	2,725	2,727	350	558	68	124	238	248	491	-1,474	701	-1,382	2.78	0.35
2	5,538	5,226	608	590	103	107	76	17	6,703	6,826	6,898	6,997	12.17	11.34
3	8,793	8,136	862	941	127	147	98	39	10,689	10,781	11,208	11,292	15.89	14.56
4	11,992	11,216	1,181	1,177	224	220	90	76	14,590	14,678	15,584	15,630	18.58	16.93
5	15,640	14,771	1,552	1,438	269	292	180	164	18,959	19,067	20,429	20,395	21.19	17.91
6	20,349	19,873	1,665	1,498	352	330	293	160	24,159	24,472	26,090	26,077	23.88	22.34
7	26,966	25,573	1,659	1,847	360	459	403	294	30,578	31,164	32,809	32,785	26.87	23.24
8	34,674	32,225	1,875	2,214	402	570	493	369	38,336	39,570	41,078	41,093	30.02	23.94
9	43,530	41,929	2,756	2,674	811	867	733	779	48,826	51,471	52,667	52,789	34.26	30.29
10	69,482	74,193	7,787	8,996	5,010	4,734	18,845	11,813	97,199	120,154	117,932	125,570	42.95	34.78
Top 5%	85,260	92,742	11,907	14,020	8,847	7,836	37,175	21,622	133,785	169,487	170,521	178,461	46.66	36.38
Top 1%	153,893	177,474	30,318	39,136	28,759	23,868	161,418	82,493	316,302	419,321	455,885	446,413	52.75	38.98
Full Sample	22,691	24,885	1,905	2,326	701	851	1,610	1,549	27,282	33,780	30,460	35,325	21.95	20.37



TABLE 2  
OLS FULL SAMPLE, OLS QUINTILES, AND QUANTILE REGRESSION RESULTS FOR WAGES AND SALARIES

Independent Variable	OLS Full Sample	OLS Quintiles					Quantile Regression				
		Bottom 20%	Second 20%	Third 20%	Fourth 20%	Top 20%	.2	.4	.5	.6	.8
TRA	4846***	909***	768***	1616***	1583***	9477***	2436***	2416***	2082***	2386***	4468***
Marital Status	325	278*	644***	1095***	1329***	3986***	44***	1089***	2058***	2074***	645**
Children	6598***	660***	415***	894***	1665***	3768***	3844***	6389***	7331***	8002***	8908***
Unemployment	-805*	588	317	998***	845*	-8614***	5124***	4609***	3332***	2188***	-650***
Elderly	-17753***	-3553***	-9513***	-16957***	-25685***	-44889***	-4875***	-11000***	-14315***	-19013***	-28581***
Constant	18852***	3877***	10426***	17821***	29107***	51164	2394***	8539***	12233	16939***	30571***
Observations	158843	31768	31769	31768	31769	31769	158843	158843	158843	158843	158843
R-squared	0.05	0.03	0.23	0.33	0.33	0.04	0.08	0.12	0.13	0.13	0.11

\*\*\* : P=0.001; \*\* : P=0.01; \* : P=0.05.

TABLE 3  
OLS FULL SAMPLE, OLS QUINTILES, AND QUANTILE REGRESSION RESULTS FOR AGI

Independent Variable	OLS Full Sample	OLS Quintiles					Quantile Regression				
		Bottom 20%	Second 20%	Third 20%	Fourth 20%	Top 20%	.2	.4	.5	.6	.8
TRA	7773***	-293	1630***	1962***	3106***	15024***	2834***	1612	4097***	7064***	7342***
Marital Status	-2754***	827	18	230**	486***	-1980	301***	586**	665**	417**	315***
Children	6721***	180***	249***	391***	656***	228	4128***	7390***	6820**	7302***	8193***
Unemployment	-3378*	3188*	547***	791***	159	-21530***	-506***	-1346***	-3032***	-3711	-2023***
Elderly	736	-358	-2108***	-5784***	-7621***	3403	-183***	-842**	-2522***	-1345	-2072***
Constant	24279	3610***	12758***	21509	33693***	74194***	5554***	11632***	15660***	20444***	34254***
Observations	158843	31768	31769	31768	31769	31769	158843	158843	158843	158843	158843
R-squared	0.01	0.01	0.10	0.20	0.19	0.01	0.04	0.06	0.06	0.06	0.04

\*\*\* : P=0.001; \*\* : P=0.01; \* : P=0.05.

TABLE 4  
OLS FULL SAMPLE, OLS QUINTILES, AND QUANTILE REGRESSION RESULTS FOR TOTAL INCOME

Independent Variable	OLS Full Sample	OLS Quintiles					Quantile Regression				
		Bottom 20%	Second 20%	Third 20%	Fourth 20%	Top 20%	.2	.4	.5	.6	.8
TRA	6940***	-100	2782***	2218***	2350***	5612	4123***	5209***	5019***	5790***	6395***
Marital Status	-2238*	504	70	-97*	-166*	-4857	280***	434***	188*	381***	317***
Children	6977***	1593***	154***	188***	268***	-616	4181***	6243***	7074***	7496***	8173***
Unemployment	-4048*	3034*	272*	452***	-18	-24602***	5203***	3412***	2925***	1166***	-2250***
Elderly	5964***	427	168*	-174*	-28	10681*	4555***	3015***	3420***	2282***	4116***
Constant	26763***	3795***	13232	23193***	36759***	89321***	5773***	12665***	16922***	22027***	36968***
Observations	158843	31768	31769	31768	31769	31769	158843	158843	158843	158843	158843
R-squared	0.03	0.03	0.25	0.10	0.07	0.01	0.05	0.05	0.05	0.05	0.03

\*\*\* : P=0.001; \*\* : P=0.01; \* : P=0.05.

TABLE 5  
OLS FULL SAMPLE, OLS QUINTILES, AND QUANTILE REGRESSION ELASTICITIES

Income Type	OLS Full Sample	OLS Quintiles					Quantile Regression				
		Bottom 20%	Second 20%	Third 20%	Fourth 20%	Top 20%	.2	.4	.5	.6	.8
Wages and Salaries:											
TRA	0.29	0.08	0.07	0.11	0.13	0.57	0.36	0.41	0.40	0.45	0.67
TRA,HighIndividualIncome	0.21	---	---	---	---	---	NS	0.19	0.28	0.49	0.71
TRA,HighStateTax	0.22	NS	NS	NS	NS	NS	NS	0.23	0.29	0.51	0.76
TRA,HighIndividualIncome, HighStateTax	NS	---	---	---	---	---	0.03	0.04	NS	0.33	0.59
AGI:											
TRA	0.39	-0.04	0.15	0.17	0.18	0.52	0.33	0.28	0.37	0.56	0.71
TRA,HighIndividualIncome	0.46	---	---	---	---	---	0.15	0.24	0.33	0.47	0.63
TRA,HighStateTax	NS	NS	NS	NS	NS	NS	0.14	0.19	0.31	0.43	0.64
TRA,HighIndividualIncome, HighStateTax	NS	---	---	---	---	---	0.02	0.01	0.41	0.51	0.52
Total Income:											
TRA	0.31	-0.02	0.29	0.20	0.21	0.21	0.51	0.54	0.47	0.44	0.41
TRA,HighIndividualIncome	0.25	---	---	---	---	---	0.22	0.31	0.31	0.47	0.50
TRA,HighStateTax	NS	NS	NS	NS	NS	NS	0.24	0.29	0.30	0.38	0.39
TRA,HighIndividualIncome, HighStateTax	NS	---	---	---	---	---	0.07	0.10	0.24	0.45	0.51

NS denotes that the elasticity is Not Significant (at 0.05 or better), based upon significance of the estimated coefficient.

TABLE 6  
COMPARISON OF *TRA* IMPACTS: ADJUSTED VERSUS UNADJUSTED DATA  
(Estimated Coefficient of *TRA*)

Dependent Variable	OLS Full Sample	OLS Quintiles					Quantile Regression				
		Bottom 20%	Second 20%	Third 20%	Fourth 20%	Top 20%	.2	.4	.5	.6	.8
Wages and Salaries											
Adjusted Data	4846***	909***	768***	1616***	1583***	9477***	2436***	2416***	2082***	2386***	4468***
Unadjusted Data	4460***	174	475**	1297***	1290***	9146***	2171***	2168***	3831***	3414***	4084***
AGI											
Adjusted Data	7773***	-293	1630***	1962***	3106***	15024***	2834***	1612	4097***	7064***	7342***
Unadjusted Data	6696***	-4-4	426***	824***	1959***	13693***	1851***	1239***	3723***	4245***	6331***
Total Income											
Adjusted Data	6940***	-100	2782***	2218***	2350***	5612	4123***	5209***	5019***	5790***	6395***
Unadjusted Data	4716***	-651	122**	-43	17	2507	4073***	2662***	1661***	1630***	1590

\*\*\* : P=0.001; \*\* : P=0.01; \* : P=0.05.

TABLE 7  
CHANGE IN REVENUES FROM A 10 PERCENT INCREASE IN THE TAX RATE<sup>a</sup>  
(in percent)

Initial Tax Rate	Tax Base Elasticity										
	0	0.2	0.4	0.6	0.8	1.0	1.5	2.0	3.0	4.0	5.0
10%	10.00%	9.75%	9.51%	9.27%	9.02%	8.78%	8.17%	7.57%	6.37%	5.19%	4.02%
20%	10.00	9.44	8.89	8.34	7.79	7.25	5.90	4.57	1.95	-0.59	-3.08
30%	10.00	9.04	8.09	7.15	6.21	5.29	3.00	0.77	-3.55	-7.68	-11.64
40%	10.00	8.49	7.01	5.54	4.09	2.67	-0.81	-4.18	-10.57	-16.53	-22.09
50%	10.00	7.71	5.46	3.26	1.11	-1.00	-6.08	-10.90	-19.91	-27.83	-35.05
60%	10.00	6.48	3.08	-0.22	-3.41	-6.50	-13.80	-20.53	-32.45	-42.58	-51.19
70%	10.00	4.31	-1.09	-6.21	-11.06	-15.67	-26.16	-35.34	-50.43	-62.00	-76.66
80%	10.00	-0.68	-10.33	-19.04	-26.90	-34.00	-48.88	-60.40	-76.24	-85.74	-91.45
90%	10.00	-30.59	-56.21	-72.37	-82.57	-89.00	-96.52	-98.90	-99.89	-99.99	-100.00
Revenue-Maximizing Tax Rate (in percent) <sup>b</sup>	100.00	83.33	71.43	62.50	55.56	50.00	40.00	33.33	25.00	20.00	16.67

<sup>a</sup> Revenues are assumed to equal the constant elasticity function  $[tA(1-t)^{\eta}]$ , where  $t$  is the tax rate,  $A$  is an arbitrary constant, and  $\eta$  is the tax base elasticity. The change in revenues is calculated by increasing the initial tax rate by 10 percent, and expressing the change from the initial level in percentage terms.

<sup>b</sup> The revenue-maximizing tax rate is calculated  $(1/(1+\eta))$ , where  $\eta$  is the tax base elasticity.