

PERCEPTIONS AND REALITIES OF AVERAGE TAX RATES IN THE FEDERAL INCOME TAX: EVIDENCE FROM MICHIGAN

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We asked a random sample of the Michigan population to identify their average tax rate in the federal individual income tax. We find that 84.9 percent of respondents overstate their actual average tax rate, many by very large amounts, with the mean/median overstatement exceeding 11 percentage points. All demographic groups have substantial overstatements. Regression analysis indicates that, all else equal, average income-tax rates tend to be overstated to a greater extent by (1) those who believe taxes on households like theirs should be lower, (2) those who get tax-preparation assistance, and (3) those who believe tax dollars are spent ineffectively.

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JEL Codes: D83, H24, H31

I. INTRODUCTION

When economists study the ways in which households respond to taxes, they often assume that the households have correct beliefs about the tax rates they face. However, problems will arise if taxpayers are misinformed (either by overstating or understating their taxes). If taxpayers are misinformed about their *marginal* tax rates, they may make suboptimal decisions regarding labor supply, saving, investment, and other aspects of their economic lives. If they are misinformed about their *average* tax rates, they will be prone to erroneous beliefs about the distribution of the tax burden; these incorrect beliefs could affect public attitudes toward tax and expenditure policies.¹

Thus, it is important to know whether households perceive tax rates correctly, and if they do not, to get a sense of the direction and magnitude of the errors in their percep-

¹ de Bartolome (1995) found that many individuals use the average tax rate “as if” it were the marginal rate.

tions. Since the 1960s, a small number of researchers have used survey methods to learn about taxpayers' beliefs regarding their marginal and average tax rates, and have then compared those beliefs with the actual rates. However, it is difficult to draw definitive conclusions from this literature because the studies are from different countries and different time-periods, and use a variety of samples and techniques. The difficulty is exacerbated by the fact that many of the studies are based on small or unrepresentative samples. If there is a consensus in the literature, it is that errors are rampant, but the studies differ in both the direction and magnitude of the errors they find.

In this paper, we have two main objectives. First, using a larger and more representative sample than used in most prior studies, we investigate perceptions of the respondent's average tax rate in the U.S. federal individual income tax, to determine both the direction and magnitude of any misperceptions. Specifically, we use survey data from a sample that is representative of the Michigan adult population, which is demographically similar to the United States as a whole in many respects. Our results indicate that an overwhelming majority (84.9 percent) of the respondents *overstate* their average income-tax rates, and that some of the misstatements are very large. In our preferred specification, we observe that the mean error is an overstatement of 11.6 percentage points, and the median respondent overstates her average income-tax rate by 11.4 percentage points.² Since we estimate the actual average income-tax rate for this sample to be 13.9 percent, our results suggest an average overstatement of about 83 percent. On average, these errors are larger than previous researchers have found.

Many of the papers in this literature simply report the average overstatement or understatement of tax rates, but do not provide any information about the *distribution* of the errors. Another of our contributions is that we find and report a remarkably wide spread of the errors, ranging from an understatement of 23.7 percentage points to an overstatement of 100 percentage points.

Our second objective is to perform a more robust analysis of the predictors of the misstatements of tax rates than has been done in prior studies. Thus, we estimate regression models of the misstatements that include explanatory variables to capture survey respondents' perceptions of the tax system, attitudes toward federal spending programs, tax-compliance behavior, and homeownership characteristics. We also include several demographic controls and a variable for ideology.

Our regression analysis indicates that, all else equal, average income-tax rates tend to be overstated to a *greater* extent by (1) those who believe federal income taxes on households like theirs should be lower, (2) those who get tax-preparation assistance from an accountant, attorney, or advisor, and (3) those who believe federal tax dollars

² The numbers in this paragraph were calculated using survey weights. Without survey weights, the size of the group we believe overstated their average tax rate decreases slightly, to 82.7 percent of those who provided an estimate of the average tax rate, and the sizes of the mean and median overstatements fall slightly to 11.2 percentage points and 10.6 percentage points.

are spent ineffectively. All else equal, average income-tax rates tend to be overstated to a *lesser* extent by those who believe federal income taxes on high-income households should be lower.

Given the well-known limitations of survey data, we perform a battery of sensitivity tests to assess the robustness of our findings. Specifically, the key question in our survey is, “What percentage of your household’s income would you say is paid in federal income tax?” While we believe the question refers clearly to the respondent’s average tax rate in the federal individual income tax, we acknowledge that some respondents may have interpreted the question differently. For example, it is possible that some respondents thought we were referring to all federal taxes that are subject to withholding, including the payroll tax as well as the income tax. Another possibility is that some respondents thought we were referring to all income taxes, including federal, state, and local income taxes. It is also possible that some respondents thought we were referring to their *marginal* tax rates in the federal individual income tax. Since each of these alternative beliefs could reduce the estimated overstatement of taxes, we test the sensitivity of our results for all of these possibilities.³ Although the magnitudes of the overstatements vary, we find that the mean and median errors involve overstatements in every case. We also find in additional regression analysis that the statistical predictors of the overstatements are fairly robust across these different specifications.⁴

II. LITERATURE REVIEW

A few researchers have studied taxpayer beliefs regarding *marginal* tax rates. Using data from a sample of high-income U.S. taxpayers for 1963, Gensemer, Lean, and Neenan (1965) find that significant numbers understated their marginal tax rates, while others overstated their rates, and others were unaware. Using U.S. data from the 1983 Survey of Consumer Finances, Fujii and Hawley (1988) find that taxpayers modestly *understated* their marginal tax rates. By contrast, in a survey of 108 American taxpayers, Rupert and Fischer (1995) find that those who *overstated* their marginal tax rate outnumber those who understated it by two to one, and that the mean overstatement was 3.61 percentage points.

Another handful of researchers have studied taxpayer beliefs regarding *average* tax rates. In a pair of early studies, Enrick (1963, 1964) finds that substantial majorities of Americans *understated* their average tax rates. However, using a survey of workers at

³ Although we investigate the possibility that respondents thought we were asking about their marginal tax rates, we were trying to ask about their average tax rates. An interesting avenue for future research would be to ask explicitly about both marginal and average tax rates. Later, we review the literature on taxpayer beliefs regarding both marginal and average tax rates.

⁴ In addition to the possibility that respondents may have interpreted “federal income tax” to mean something else, we also acknowledge that respondents may have a variety of income concepts in mind when they answer a question about “percentage of your household’s income.” This could also affect the interpretation of the self-reported average tax rates.

11 U.S. firms, Wagstaff (1965) finds that the proportion of taxpayers understating their taxes was about the same as the proportion overstating (42.9 percent of respondents understated their taxes, while 44.5 percent overstated them). The mean of the responses was an *overstatement* of 4.6 percent.

In an important recent study, Gideon (2017) uses data from the 2011 wave of the Cognitive Economics Study to assess beliefs about both average and marginal income-tax rates. On average, his survey respondents systematically *overstated* their average tax rates, although their estimates of marginal rates are accurate at the mean.⁵

All of the studies mentioned earlier are for the United States. Studies using data from other countries also provide contradictory results.⁶ All of these studies are concerned with misperceptions of *individual* taxes. However, surprisingly, misperceptions appear to extend to corporate taxpayers, as well. In a recent paper, Graham et al. (2017) show that many corporations use average tax rates in making incremental decisions, when theoretically they should be using marginal rates.

One paper that is closely related to this literature is Slemrod (2006). He presents evidence that people believe, contrary to fact, that the existing income tax is regressive, and that high-income people would pay more under a flat tax. This misperception appears to explain some of the support for a flat tax.⁷ Slemrod also finds that similar misconceptions about the estate tax explain some of the support for eliminating it — about half of Americans apparently believe that most families have to pay the estate tax, whereas only a tiny fraction actually pay.⁸

With regard to other economic issues, large misperceptions are equally widespread. For example, Walstad's (1997) results from a 1992 survey of economic literacy reveal a substantial lack of knowledge of the nature of fiscal policy, monetary policy, budget deficits, and other important economic phenomena. Similarly, the Kaiser Family Foun-

⁵ Gideon's sample is 90 percent white, mostly older (54 percent age 65 and above), and mostly college educated (53 percent with a Bachelor's degree or higher), with median household income of more than \$65,600. These demographics differ substantially from the U.S. population.

⁶ Using data from Scottish workers and managers, Brown (1969) finds that large majorities *overstated* their marginal tax rates. Lewis (1978) surveys residents of Bath, Somerset, and finds a tendency to *understate* marginal tax rates; the perceived rates were about 10 percentage points below the actual rates. Wahlund (1989) finds that, on average, a sample of Swedish men *understated* their marginal tax rates in 1982, but *overstated* the rates in three subsequent surveys in 1983 and 1984. Using data from the 1995 British Social Attitudes Survey, Gemmill, Morrissey, and Pinar (2004, p. F117) find a "systematic bias towards over-estimation" of marginal tax rates (emphasis in the original), although their measure of the degree of misperception is very crude. Auld (1979) uses a 1975 survey in which Ontario residents were asked how many dollars they paid in income tax. He finds substantial *overstatement* of taxes by low-income respondents, along with *understatement* by those in the middle and upper income ranges. Using Swedish data from 2003, Kapteyn and Ypma (2007) find a tendency toward *overstatement* of average tax rates.

⁷ Slemrod and Bakija (2004) report on a 1989 survey, which suggests that the public believes that 45 percent of millionaires pay no income tax at all, whereas Internal Revenue Service data show that the correct figure is below 2 percent.

⁸ For the 2015 tax-filing year, 11,917 estate tax returns were filed, of which 4,918 turned out to be taxable. In that same year, the number of deaths in the United States was about 2.71 million. Thus, only about two-tenths of 1 percent of decedents had a taxable estate.

dation (2013) found that the average American believes that 28 percent of the federal budget is spent on foreign aid, whereas the correct figure is about 1 percent.

In addition to these misperceptions regarding the economy, there is evidence of a strong tendency for members of the public to overstate the size of minority populations, often to a remarkably large degree. Gallup and Newport (1990, p. 2) report that “The average American thinks that America is 32 percent black, 21 percent Hispanic, and 18 percent Jewish.”⁹ Nadeau, Niemi, and Levine (1993) and Alba, Rumbaut, and Marotz (2005) report similar findings.

The key takeaways from this literature are that there are very widespread misperceptions about average and marginal tax rates, as well as many other economic and social phenomena.

III. EMPIRICAL APPROACH, DATA, AND VARIABLES

Our empirical approach is guided by the study’s two objectives. First, in order to examine the direction and magnitude of individuals’ misperceptions of their average tax rates in the federal income tax, we need measures of their perceived and actual tax rates. Second, to analyze how these misperceptions are related to various respondent characteristics and attitudes, we need to specify and estimate regression models of the misperceptions.

We use survey data (described in detail later) to obtain measures of individuals’ perceived and actual tax rates. We base our measure of the perceived tax rate on the survey question, “What percentage of your household income would you say is paid in federal income tax?” We use demographic variables from the survey, together with IRS data on tax parameters, to estimate the actual tax rate. The perceived and actual tax rates allow us to construct our key variable, *OVERSTATEMENT*, which is our estimate of the number of percentage points by which our calculations indicate that respondents have overstated their average income-tax rates. Our regression models take the following form:

$$(1) \quad \text{OVERSTATEMENT}_i = \beta_0 + \beta_1 \text{DEMOGRAPHIC CONTROLS}_i + \beta_2 \text{IDEOLOGY}_i \\ + \beta_3 \text{TAX SYSTEM PERCEPTIONS}_i + \beta_4 \text{FEDERAL SPENDING PERCEPTIONS}_i \\ + \beta_5 \text{TAXPAYER COMPLIANCE BEHAVIORS}_i \\ + \beta_6 \text{HOMEOWNERSHIP CHARACTERISTICS}_i + \varepsilon_i$$

where β_2 is a coefficient, the other β ’s are vectors of coefficients, and ε_i is an error term.

We will discuss the dependent and explanatory variables in detail, after describing the survey data. We provide definitions of these variables in Table 1.

⁹ The U.S. Census reports that in 1990 blacks accounted for 12.1 percent of the U.S. population, whereas Hispanics were 9.0 percent and Jews were 2.1 percent.

Table 1
Variable Definitions[†]

Dependent Variable:

OVERSTATEMENT = the difference between the respondents' *reported* average federal income-tax rates and our calculations of their *actual* tax rates.

Explanatory Variables:

A. Demographic Controls

1. *MALE* is a dummy variable, = 1 if the respondent is male, 0 otherwise.
2. *YEARS OF AGE* is the age of the respondent, ranging from 18 to 92.
3. *WHITE* is a dummy variable, = 1 if the respondent is white, 0 otherwise.
4. *YEARS OF EDUCATION* is the number of years of education of the respondent. For those who report some post-graduate education, we code this variable as 17. For those who report that they have a graduate degree, we code the variable as 18. The survey questionnaire does not distinguish among different types of graduate degrees.
5. *NUMBER OF CHILDREN* is the respondent's number of children, ranging from 0 to 10.
6. *MARRIED* is a dummy variable, = 1 if the respondent is married, 0 otherwise.
7. *LOG OF INCOME* is the natural logarithm of the respondent's self-reported estimate of the household's income. Income is reported in 10 closed income ranges and one open-ended range. The limits of the closed ranges are \$10,000, \$20,000, \$30,000, \$40,000, \$50,000, \$60,000, \$70,000, \$90,000, \$100,000, and \$150,000. For the closed ranges, we assign the household's income to be the midpoint of the range. For the open-ended category (income above \$150,000), we use \$300,000.

B. IDEOLOGY is self-reported ideology, on the standard seven-point scale. 1= very liberal; 2= somewhat liberal; 3= lean liberal; 4 = middle or moderate; 5 = lean conservative; 6 = somewhat conservative; 7 = very conservative.

C. Tax System Perceptions

1. *TAX ON SIMILAR* is the response to "When you think about households like yours, do you think the percentage that you pay in federal income tax should be much higher than it is now, somewhat higher than it is now, somewhat lower than it is now, much lower than it is not, or is about right?" 1 = should be much higher; 2 = should be somewhat higher; 3 = about right; 4 = should be somewhat lower; 5 = should be much lower.
2. *TAX EFFECTIVENESS* is the response to "Overall, how well do you think the federal government spends your tax dollars? Would you say it is spent very effectively, somewhat effectively, somewhat ineffectively, or very ineffectively?" 1 = very effectively; 2 = somewhat effectively; 3 = neither effectively nor ineffectively (volunteered response); 4 = somewhat ineffectively; 5 = very ineffectively.

Table 1(Continued) Variable Definitions[†]

3. *TAX ON HIGH INCOME* is the response to a question that is structured identically to the question for *TAX ON SIMILAR*, except that it has “high-income households,” instead of “households like yours.”
4. *TAX ON LOW INCOME* is the response to a question that is structured identically to the question for *TAX ON SIMILAR*, except that it has “low-income households,” instead of “households like yours.”

D. Federal Spending Perceptions

1. *CASH FOR POOR* is the response to “please tell me whether the amount of cash payments to poor families by the federal government is much less than it should be, is somewhat less than it should be, is about what it should be, is somewhat more than it should be, or is much more than it should be.” 1 = much less than it should be; 2 = somewhat less than it should be; 3 = about what it should be; 4 = somewhat more than it should be; 5 = much more than it should be.
2. *MILITARY SPENDING* is the response to a question that is structured identically to the question for *CASH FOR POOR*, except that it has “military expenditures” instead of “cash payments to poor families.”
3. *SOCIAL SECURITY* is the response to a question that is structured identically to the question for *CASH FOR POOR*, except that it has “Social Security payments” instead of “cash payments to poor families.”
4. *FOREIGN AID* is the response to a question that is structured identically to the question for *CASH FOR POOR*, except that it has “aid payments to foreign governments” instead of “cash payments to poor families.”

E. Taxpayer Compliance Behaviors

1. *TAX ASSISTANCE* is a dummy variable, = 1 if the household gets assistance from a tax accountant or attorney, or an advisor at a company like H&R Block, 0 otherwise.
2. *SOFTWARE* is a dummy variable, = 1 if the household uses tax-preparation software or websites, such as TurboTax, 0 otherwise.
3. *OWN PREPARER* is a dummy variable, = 1 if the respondent is the member of the household who is responsible for preparing income-tax returns, or if responsibility is shared with another member of the household, 0 if a different member of the household is responsible for preparing income-tax returns.

F. Homeownership Characteristics

1. *HOMEOWNER* is a dummy variable, = 1 if the household owns its home, 0 otherwise.
2. *MORTGAGE* is a dummy variable, = 1 if the household is currently paying on a mortgage, 0 otherwise.

[†] The variables in sections A and B of this table are part of every round of Michigan State University’s SOSS. The authors commissioned the other variables especially for this round of the survey.

A. The Survey Data

Our dataset is created from a survey of 978 Michigan adults, ranging in age from 18 to 92. The survey was conducted in August, September, and October, 2013, as part of Round 66 of Michigan State University's State of the State Survey (SOSS). This telephone-interview survey, which was established in 1994, has provided the data for many published papers, including Davis and Silver (2003), Kaplowitz, Broman, and Fisher (2006), and Skidmore, Ballard, and Hodge (2010). When properly weighted, the SOSS data constitute a random sample of the non-institutionalized Michigan adult population. We believe that evidence from Michigan (the tenth most populous state in the United States) is of interest in its own right. More importantly, the demographic, economic, and social characteristics of the Michigan population are rather similar to national averages in most respects, making it possible to generalize our results to the broader American population.¹⁰

SOSS provides survey weights to correct for unequal probabilities of selection into the sample, and most research papers based on SOSS data have used survey weights.¹¹ However, Solon, Haider, and Wooldridge (2015) argue that it is not always appropriate to use survey weights when attempting to estimate causal effects. The issues discussed by Solon, Haider, and Wooldridge are sufficiently complex that they conclude (p. 308) "it often is good practice to report both weighted and unweighted estimates." In what follows, we will sometimes report data and estimates in both their weighted and unweighted versions. However, we find that the results from the weighted and unweighted versions are fairly similar. Hence, in some cases, we only report the weighted results, but the unweighted results are available on request.

Every round of the SOSS asks questions about age, race, sex, education, number of children, marital status, household income, and ideology. These questions form the basis of our demographic control variables and the ideology variable. The other explanatory variables in equation (1) are based on a set of additional questions that we commissioned exclusively for this round of the survey.

Our commissioned questions in the survey were motivated by our belief that the answers could possibly shed light on respondents' opinions about their average federal income-tax rates, and thereby help identify the predictors of their misperceptions. For example, we asked whether the respondents thought that the current rates of federal income tax paid by households like theirs should be higher or lower, or are about right, on grounds that views about whether their tax rates are appropriate could be associated

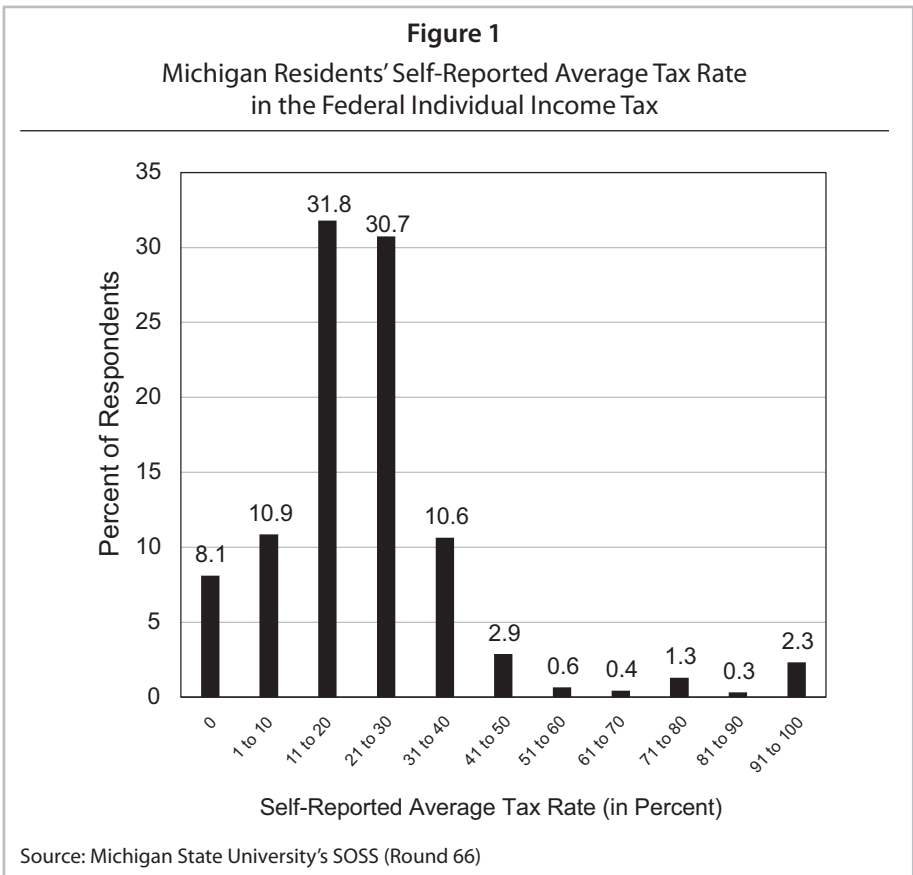
¹⁰ There are two notable exceptions. First, the proportion of the population that is either Asian or Hispanic is smaller in Michigan than in the United States as a whole. Second, per-capita income in Michigan was about 12 percent below the national average in 2013, when the survey used in this paper was taken. Additional details on demographics, both for Michigan and for the SOSS sample, are available upon request.

¹¹ For example, the weights correct for differences in sampling rates between listed landlines, unlisted landlines, and cell phones. The weights also correct for differences in the number of telephone lines in different households, since a household with five phone lines is five times as likely to be contacted as a household with a single line. SOSS also weights the responses to adjust for differences in non-response rates for different demographic groups. Additional details about the Survey can be found in the Methodological Report, at http://www.ippsr.msu.edu/sites/default/files/soss66method_i.pdf.

with beliefs about the actual level of tax rates. For the same reason, we asked about views toward the current rates of federal income tax for high-income households and low-income households. We asked about attitudes toward four categories of federal spending, on grounds that views regarding spending could spill over into beliefs about tax rates, since taxes provide the revenues for such spending. We also asked respondents whether they use a tax preparer or tax-preparation software, on grounds that these behaviors could affect the salience of the federal income tax in their minds. The top-line responses for all of the independent variables are available upon request.

B. Perceptions of Average Income-Tax Rates

In Figure 1, we show the distribution of self-reported income-tax rates, for the 748 respondents who gave a usable answer to the question, for bins covering 10 percentage points. We did not explicitly request that respondents provide a non-negative integer answer, but all did. More than 75 percent of the respondents reported an integer that is divisible by five, and nearly half reported an integer divisible by ten.



The responses are remarkably dispersed. When we use weights, we find that 8.1 percent of the respondents said their household paid no income tax; this rises to 9.6 percent when weights are not used. The median response was that the household paid 20 percent of its income in federal income tax. (An average tax rate of 20 percent was also the modal response, provided by 18.2 percent of respondents; another 14.1 percent of respondents reported an average tax rate of 30 percent.¹²) The mean response was 25.5 percent when survey weights are used, and 25.3 percent when they are not.¹³

At the other end of the spectrum, 2.3 percent of the respondents said they believe their household paid 100 percent of its income in federal income tax. In addition to those who gave 100 percent as their answer, another 8 percent of respondents reported an average tax rate that is less than 100 percent but greater than 40 percent. If the respondent interpreted the question as referring to the average tax rate in the federal income tax, as the question asked, *any* rate of 40 percent or more cannot possibly be correct, since the top *marginal* tax rate was 35 percent in 2012, and 39.6 percent in 2013.

The results shown in Figure 1 are for the 748 respondents who gave a useful answer to the question about the percentage of income paid in federal income tax. Some 230 respondents either said they did not know, or refused to answer. Of these, the vast majority said they did not know. When we use survey weights, 22.3 percent of the respondents said they did not know, while only 1.6 percent refused to answer. Thus, more than one-fifth of our respondents said they do not know their average tax rate, and the responses from those who *did* give an answer include some remarkably high tax rates. In our view, these two results reinforce each other, in that both suggest that a very substantial portion of the population is uninformed or misinformed about average federal income-tax rates.

Since many of the self-reported average tax rates appear to be highly inaccurate, we ran validity checks to examine the possibility that the responses are completely arbitrary. In Table 2, we show the weighted median and mean of the self-reported tax rates for each of 11 household-income ranges. The median tax rates tend to increase with income; with one exception, the increases are weakly monotonic. The mean tax rates also tend to increase with income, although once again the increases are not monotonic. Table 2 also shows the percent of respondents in each income category whose self-reported tax rate is zero. In each of the three lowest income categories, more than 20 percent of the respondents say that their tax rate is zero, with the lowest income category reporting the highest percentage of zero tax rate (30.8 percent). In contrast, the percent reporting a tax rate of zero is much lower in the higher income categories. We interpret these data as suggesting that, although the self-reported tax rates contain widespread errors, they appear roughly consistent with the realities of the U.S. federal income-tax system.

¹² The percentages in this sentence involve survey weights. Without weights, 15.6 percent reported an average tax rate of 20 percent, and 14.2 percent reported a rate of 30 percent.

¹³ By contrast, the sample used by Gideon (2017) has a median reported average tax rate of 15 percent, and a mean of 15.4 percent.

Table 2
Self-Reported Average Tax Rates, by Household Income,
Using Survey Weights

Household Income Range	Percent Reporting Zero	Median	Mean
Below \$10,000	30.8	10%	18.3%
\$ 10,000–\$ 19,999	24.4	10	13.1
\$ 20,000–\$ 29,999	20.9	20	18.9
\$ 30,000–\$ 39,999	8.8	20	20.1
\$ 40,000–\$ 49,999	10.8	20	25.6
\$ 50,000–\$ 59,999	0.0	18	19.2
\$ 60,000–\$ 69,999	3.6	25	26.5
\$ 70,000–\$ 89,999	0.4	25	23.8
\$ 90,000–\$ 99,999	4.8	25	25.6
\$100,000–\$149,999	3.1	25	25.8
\$150,000 or more	6.3	25	27.9

Source: Michigan State University's SOSS (Round 66)

C. Calculations of Actual Average Income-Tax Rates

The demographic questions in the survey give us enough information to estimate the actual average federal income-tax rate faced by each respondent. For most households, we know the number of adults and children, so we can calculate the personal exemptions, and we know the marital status of the respondent, so we can apply the appropriate tax-rate schedule. (We assume that all married couples file a joint return.¹⁴) We use information from the survey to estimate the income for each household; in turn, the estimate of income is an input into our estimates of the income-tax rates.¹⁵ Household income is collected in the 11 income ranges shown in Table 2. For the lowest ten of those income ranges, we usually assume that the household's income is at the midpoint of

¹⁴ In 2012 and 2013, more than 95 percent of the married returns were joint returns. However, the rest of the married couples filed separate returns, which can alter tax liabilities in either direction. Thus, for any married person in our sample who actually filed a separate return, our estimate of the tax liability could be biased.

¹⁵ We assume that the tax rates for earned income are applied to all taxable income. However, dividends and long-term capital gains were taxed at lower rates than earned income at the time of this survey. Thus, for those in our sample who have dividend and long-term capital-gain income, our estimate of the tax rate will be biased upward.

the range.¹⁶ The top income category, for households with incomes above \$150,000, is open-ended. For most of our calculations, we assume that households in the top income category have an income of \$300,000.¹⁷

We use data from the Internal Revenue Service, Statistics of Income (2013, 2014) to estimate the amount of itemized deductions that the household might claim. For households for which this amount exceeds the standard deduction, we assume that the household itemizes its deductions; otherwise, we apply the standard deduction.

Using the information on household income and the number of children, we also estimate the Earned Income Tax Credit (EITC) for which the household is eligible.¹⁸ Note that, for many low-income households who receive the EITC, the actual average tax rate is negative. However, none of our respondents reported a negative rate, which suggests they did not consider the EITC when responding to our question about their average income-tax rates. Thus, although we calculate the average tax rate with and without the EITC, we will focus primarily on the calculations that ignore the EITC, and later report the sensitivity of our results when we do use the EITC.

This survey was conducted in the summer and fall of 2013. This leads to the question of whether we should apply the tax rates for 2012 or 2013. Since the respondents had recently filed their income-tax returns for the 2012 tax year when they took the survey, our preferred calculation uses the tax-rate schedules, exemptions, and standard deductions for 2012. However, we also perform the calculations with the 2013 tax-law parameters, and report those results later, along with other sensitivity tests.¹⁹

Using the tax parameters for 2012 and ignoring the EITC, we estimate that the actual average tax rate for our survey respondents is 13.89 percent, calculated as the total tax paid divided by total income. Data from the Internal Revenue Service (2013) indicate that Michigan taxpayers actually paid 12.34 percent of their adjusted gross income in federal income tax.²⁰ The details of our calculations of the actual average federal income-tax rates are available upon request.

¹⁶ We have also performed our statistical analysis under alternative assumptions regarding where household incomes fall in these closed income categories. The results, which are available upon request, indicate that these assumptions have only a very small effect.

¹⁷ We have also performed our statistical analysis using \$250,000 and \$350,000 for the income of those in the top income category. The results, which are available upon request, are not sensitive to this assumption.

¹⁸ A fraction of those who are eligible for the EITC do not claim it (Scholz 1994). Thus, for anyone in our sample whose household does not claim EITC payments for which they are eligible, our estimate of the tax liability will be biased downward. On the other hand, some households have managed to claim EITC payments for which they are ineligible (McCubbin 2000). For anyone in our sample whose household claims EITC payments for which they are not eligible, our estimate of the tax liability will be biased upward.

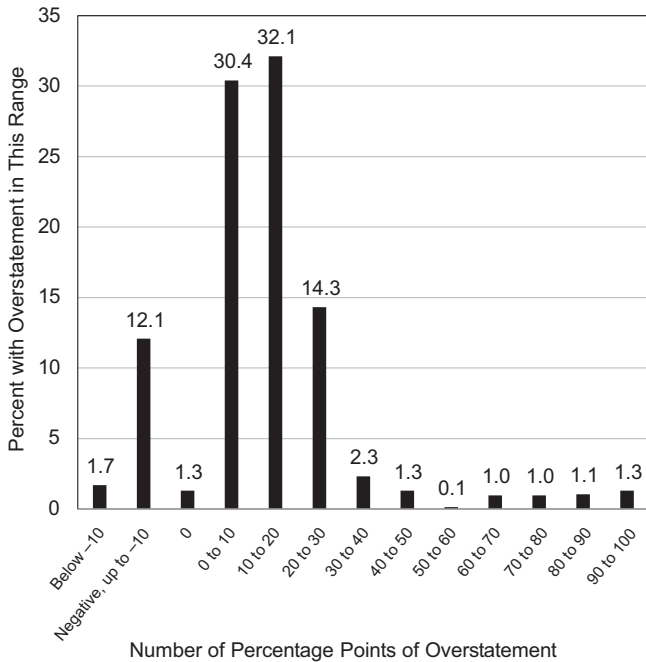
¹⁹ Wahlund (1989) provides an interesting discussion of the ways in which taxpayers update their assessments of their tax rates. He conducted four surveys of Swedish men, at six-month intervals in 1982, 1983, and 1984, at a time when marginal tax rates for some Swedes were being reduced substantially. Wahlund concludes (p. 135) that the tax cuts "were only partly perceived, not at once, and not at the same time by everybody."

²⁰ The IRS calculates this percentage by dividing total tax paid by total income. For comparability, we calculated the overall average income-tax rate for our respondents in the same way.

D. Comparisons of Perceived and Actual Average Tax Rates

In Figure 2, we show our estimates of *OVERSTATEMENT*, defined as the difference between the respondents' *reported* average federal income-tax rates and our calculations of their *actual* tax rates. These estimates are based on 2012 tax-law parameters, excluding the EITC from the calculations. For those who provided an estimate of the average tax rate, 13.8 percent indicate that they pay a lower rate than our calculations suggest. Another 1.3 percent report an average rate that corresponds exactly to our calculations. (All of these were respondents who say that their average tax rate is zero, and for whom we believe the average tax rate is indeed zero.) That leaves 84.9 percent who we believe have overstated their average federal income-tax rate. When we compare the mean overstatement of 11.6 percentage points with our estimate that the actual average income-tax rate for this sample is 13.9 percent, our calculations suggest a very large overstatement of about 83 percent, on average.

Figure 2
 Distribution of the Estimated Number of Percentage Points
 by Which Michigan Residents Overstate Their Average Tax Rate
 in the Federal Individual Income Tax



Source: Michigan State University's SOSS (Round 66), and authors' calculations

As mentioned earlier, some of the respondents gave *very* large estimates of their households' average income-tax rates. However, even if we exclude some of the largest of these observations, the picture of substantial overstatement of taxes does not change fundamentally. If we exclude those who say their average tax rate is 100 percent, the weighted mean overstatement drops from 11.6 percentage points to 9.9 percentage points. If we exclude those who report an average tax rate of 70 percent or higher, the mean overstatement drops to 8.9 percentage points, and it drops to 8.4 percentage points if we exclude those who report an average tax rate of 50 percent or higher. We consider that any of these values is evidence of a substantial degree of overstatement.

Before moving to the regression analyses, we report the following in Table 3, for subgroups with a variety of demographic and other characteristics: (1) the percent who provided a usable self-reported average tax rate, (2) the median self-reported average tax rate, (3) the mean self-reported average tax rate, (4) our estimate of the actual average income-tax rate, and (5) our estimate of the mean number of percentage points by which respondents overstate their federal income-tax rates.

As shown in Table 3, our calculations suggest that, on average, women overstate their income-tax rates more than men, and blacks and Hispanics overstate their income-tax rates more than whites. Those without a Bachelor's degree overstate their income-tax rates by more than those with a Bachelor's degree or higher.²¹ Table 3 also shows the mean overstatement for those from different age groups, different marital statuses, different income levels, and different political ideologies. The central message of Table 3 is that our calculations indicate a substantial overstatement of the average income-tax rate by each of these groups. Our calculations indicate that no group has an average overstatement that is close to zero.

IV. ECONOMETRIC ISSUES REGARDING THE SAMPLE

Before estimating the regression models, one important issue to address is the extent to which we should include the outliers in our regressions. As mentioned earlier, more than 2 percent of those who answered the question regarding their average income-tax rate said it was 100 percent, and some others gave remarkably high answers. To the extent that these responses are meaningless noise, including them could undermine our ability to uncover the true relationships between *OVERSTATEMENT* and the explanatory variables of interest.

Many of the respondents who gave a very high value for the average income-tax rate were also among those who did not respond to some of the other questions that we used to construct variables. As a result, they were not included in our regressions.²² However,

²¹ However, as we shall see later, these univariate differences by race, sex, and education do not lead to statistically significant regression coefficients when we use the full set of explanatory variables in regressions with *OVERSTATEMENT* as the dependent variable.

²² The regressions reported here use variables based on all but one of the questions that we commissioned in this round of the SOSS. We decided to exclude a variable based on a question asking for a comparison between the overall rate of taxation in the United States and the overall rate of taxation in other advanced countries. Inclusion of this single variable would have led to the loss of an additional 58 observations, due to a high rate of non-response. However, when we do run the regressions with this variable, its coefficient is not significant, and the overall regression results generally are similar.

Table 3
**Mean and Median Self-Reported Average Tax Rate,
 Estimated Actual Average Tax Rate, and Estimated Mean Overstatement,
 for Subgroups of Michigan Residents, Using Survey Weights**

Group	Percent Responding	Median Self- Reported Avg. Tax Rate (in Percent)	Mean Self- Reported Avg. Tax Rate (in Percent)	Estimated Avg. Actual Tax Rate (in Percent)	Estimated Mean Overstatement (in Percentage Points)
All	76.2	20	25.5	13.9	11.6
Female	70.3	20	25.3	12.8	12.5
Male	82.5	20	25.6	14.7	10.9
Age 18–29	62.2	20	24.2	15.5	8.7
Age 30–64	83.7	25	25.9	13.8	12.1
Age 65 and over	68.6	15	23.4	12.0	11.4
Asian	81.8	20	23.2	18.0	5.1
Black	81.3	20	28.1	12.4	15.6
Hispanic	82.2	30	41.7	13.6	28.1
Native American	50.1	15	21.6	15.6	6.0
Other	71.5	25	25.0	16.5	8.4
White	75.2	21	25.3	13.8	11.5
Less than bachelor's degree	70.5	20	28.1	11.5	16.5
Bachelor's degree or higher	83.6	22	24.0	15.3	8.6
Married	80.8	25	25.1	13.6	11.5
Divorced, widowed, separated	73.0	18	23.5	12.3	11.2
Single, never married	70.5	20	28.2	15.7	12.5
Income below \$50,000	69.9	20	22.8	5.6	17.2
Income above \$50,000	80.6	25	26.0	15.4	10.6
Conservative	76.2	20	24.5	13.3	11.2
Liberal	76.9	25	26.2	14.4	11.8

Source: Michigan State University's SOSS (Round 66) and authors' calculations

some who reported an unusually large tax rate did answer all of the other questions. For these, we eliminated the observations for which the value of the standardized residual was greater than 3.0.²³ This procedure resulted in eliminating 13 observations. All of these observations had a self-reported average income-tax rate of 70 percent or higher, and eight of the 13 had a self-reported tax rate of 100 percent. The sample that remains after this exclusion includes every observation for which the respondent answered all of the questions, and for which the self-reported average tax rate was 69 percent or less. The

²³ All of the excluded observations had a positive standardized residual. Among the observations with a negative standardized residual, none was as large as 2.0 in absolute value.

sample also includes one observation with a self-reported rate of 70 percent, and another with 75 percent. The sample that we ultimately use in our regressions has 502 observations.

The issue of sample-selection bias could potentially be addressed using the method suggested by Heckman (1979). However, we cannot make a strong argument that our dataset contains any variables that influence knowledge of tax rates and willingness to report, but do not have a direct effect on misstatements of the tax rate.

V. REGRESSION RESULTS

In this section, we report the results of regressions in which the dependent variable is *OVERSTATEMENT*. Throughout the analysis, we will continue to use the 21 explanatory variables described in Table 1. We will devote the most attention to the specification for which we use the 2012 tax-law parameters without the EITC. The results are shown in the first two columns of Table 4.

We begin with the demographic variables. The coefficients for *YEARS OF AGE* are negative and statistically significant at the 1-percent level. These coefficients indicate that, all else equal, older persons overstate their average income-tax rates by less than younger ones.²⁴ The coefficients for *MARRIED* indicate that, all else equal, married persons overstate their tax rates by more than those who are not married. The coefficients for *LOG OF INCOME* indicate a negative relationship between income and the extent of overstatement, all else equal. On the other hand, the coefficients for *MALE*, *WHITE*, *YEARS OF EDUCATION*, and *IDEOLOGY* are not significant.

The positive coefficients for *TAX ON SIMILAR* in the first two columns of Table 5 indicate that, all else equal, those who believe that the federal income taxes paid by households like theirs are too high will tend to overstate their average income-tax rate to a greater degree. The effect of *TAX ON SIMILAR* is significant at the 1-percent level, regardless of whether we use survey weights. In the weighted case, the coefficient estimate is 2.46, implying that a respondent who says that the taxes on households similar to hers should be much lower than they are now would overstate the average income-tax rate by roughly 10 percentage points more than a respondent who says that such taxes should be much higher than they are now, all else equal. This effect is even larger if we use the coefficients from the unweighted regressions.

The coefficients for *TAX ASSISTANCE* are positive and significant. This indicates that, all else equal, the overstatements are larger for those who engage an accountant, attorney, or advisor for tax preparation. The magnitude of the estimated coefficient suggests that a respondent who uses a tax-preparation professional would overstate the

²⁴ The estimated coefficients for *YEARS OF AGE* help to explain some of the differences between our results and those of Gideon (2017). Gideon's sample has a mean age of 67.9 years, whereas the mean age in our sample is 47.3 years. If we accept our coefficients indicating that older respondents overstate their average income-tax rates by less, and if we were to use a sample with Gideon's distribution of age, the degree of overstatement in our data would be reduced by about 2 percentage points. However, this would still leave us with a very large degree of overstatement.

Table 4
OLS Regression Results for Effects of Taxpayer Characteristics and Attitudes on Overstatement of the Average Federal Income-Tax Rate, with and without Survey Weights[†]

Independent Variable	Dependent Variable:		Dependent Variable:	Dependent Variable:
	<i>OVERSTATEMENT</i> (Weighted)	<i>OVERSTATEMENT</i> (Unweighted)	<i>TAX</i> <i>PERCENTAGE</i> (Weighted)	<i>TAX</i> <i>PERCENTAGE</i> (Unweighted)
<i>MALE</i>	-0.800 (1.206)	-0.453 (0.975)	-0.890 (1.194)	-0.478 (0.969)
<i>YEARS OF AGE</i>	-0.102** (0.041)	-0.120*** (0.037)	-0.111*** (0.040)	-0.125*** (0.036)
<i>WHITE</i>	-0.444 (1.665)	-2.095 (1.393)	0.291 (1.678)	-2.110 (1.386)
<i>YEARS OF EDUCATION</i>	0.295 (0.268)	0.224 (0.243)	0.299 (0.265)	0.249 (0.242)
<i>NUMBER OF CHILDREN</i>	0.732* (0.432)	0.643 (0.424)	-0.180 (0.430)	-0.272 (0.422)
<i>MARRIED</i>	4.759*** (1.212)	4.121*** (1.103)	1.063 (1.269)	0.449 (1.097)
<i>LOG OF INCOME</i>	-3.894*** (0.867)	-3.164*** (0.697)	2.745*** (0.879)	3.426*** (0.693)
<i>IDEOLOGY</i>	-0.399 (0.292)	-0.358 (0.278)	-0.385 (0.290)	-0.358 (0.276)
<i>TAX ON SIMILAR</i>	2.460*** (0.793)	3.218*** (0.641)	2.472*** (0.792)	3.262*** (0.638)
<i>TAX EFFECTIVENESS</i>	0.964** (0.448)	0.750* (0.432)	0.803* (0.448)	0.649 (0.430)
<i>TAX ON HIGH INCOME</i>	-1.125* (0.600)	-1.142** (0.488)	-1.158** (0.585)	-1.121** (0.486)
<i>TAX ON LOW INCOME</i>	0.015 (0.557)	0.101 (0.520)	0.043 (0.547)	0.036 (0.517)
<i>CASH FOR POOR</i>	0.371 (0.485)	0.069 (0.424)	0.247 (0.481)	-0.031 (0.421)
<i>MILITARY SPENDING</i>	-0.010 (0.439)	-0.154 (0.377)	0.008 (0.434)	-0.116 (0.375)
<i>FOREIGN AID</i>	-0.397 (0.409)	0.136 (0.336)	-0.266 (0.402)	0.224 (0.335)
<i>SOCIAL SECURITY</i>	-0.966* (0.529)	-0.546 (0.516)	-0.850* (0.511)	-0.493 (0.514)
<i>TAX ASSISTANCE</i>	2.801** (1.295)	2.788** (1.132)	2.611** (1.279)	2.575** (1.125)

Table 4 (Continued) OLS Regression Results for Effects of Taxpayer Characteristics and Attitudes on Overstatement of the Average Federal Income-Tax Rate, with and without Survey Weights[†]

Independent Variable	Dependent Variable:	Dependent Variable:	Dependent Variable:	Dependent Variable:
	<i>OVERSTATEMENT</i> (Weighted)	<i>OVERSTATEMENT</i> (Unweighted)	<i>TAX</i> <i>PERCENTAGE</i> (Weighted)	<i>TAX</i> <i>PERCENTAGE</i> (Unweighted)
<i>SOFTWARE</i>	2.458* (1.345)	1.295 (1.146)	2.055 (1.346)	0.948 (1.139)
<i>OWN PREPARER</i>	-0.062 (1.230)	-0.395 (1.040)	0.188 (1.239)	-0.273 (1.034)
<i>HOMEOWNER</i>	1.312 (1.848)	1.143 (1.637)	1.344 (1.830)	1.322 (1.628)
<i>MORTGAGE</i>	-0.083 (1.307)	0.614 (1.157)	-0.057 (1.307)	0.606 (1.150)
<i>CONSTANT</i>	17.051*** (6.298)	14.354** (6.282)	3.096 (6.290)	0.352 (6.247)
No. of Observations	502	502	502	502
R-Squared	0.2008	0.1897	0.1913	0.2378
Prob. > F	0.0000	0.0000	0.0000	0.0000

[†] Standard errors are in parentheses. Two-tailed significance levels are indicated as: *=10%, **=5%, and ***=1%. These regressions use 2012 tax parameters.

average tax rate by nearly 3 percentage points more than a respondent who does not do so, holding other influences constant.

TAX EFFECTIVENESS also has a positive and significant effect on *OVERSTATEMENT*. The coefficients suggest that, all else equal, a respondent who says that federal tax dollars are spent very ineffectively would overstate his household's average income-tax rate by between 3 and 4 percentage points more than a respondent who says that tax dollars are spent very effectively.

The negative and significant coefficients for *TAX ON HIGH INCOME* suggest that a respondent who says that the federal income taxes on high-income households should be much lower than they are now would overstate the average income-tax rate by about 4 percentage points *fewer* than a respondent who says that such taxes should be much higher than they are now, all else equal.²⁵

²⁵ The details of the responses to *TAX ON HIGH INCOME* and *TAX ON LOW INCOME* are available upon request. The responses indicate that the Michigan adult population would prefer the federal income tax to be somewhat more progressive than it is now. This is consistent with the results of Hite and Roberts (1991), who find an overall preference for a mildly progressive rate structure, using a survey of heads of household in the United States. In a review of the studies by Hite and Roberts and others, Sheffrin (1993) concludes that views about preferred rates depend on context. Sheffrin (2013) emphasizes the tremendous heterogeneity of views about the optimal progressivity of the tax system.

Table 5
 Descriptive Statistics for Overstatement of Tax Rates, for Different Assumptions about What Respondents Believed They Were Identifying in Response to the Question:
 "What percentage of your household's income would you say is paid in federal income tax?"
 (in Percentage Points)

	(1)	(2)	(3)	(4)	(5)	(6)
Average Rate in Federal Income Tax (Our Base Case: Respondent Interpreted Question as Written)						
Mean overstatement (weighted)	11.6	6.2	7.4	12.0	6.5	2.3
Mean overstatement (unweighted)	11.2	4.7	7.0	11.5	6.4	2.2
Median overstatement (weighted)	11.4	5.0	7.7	12.0	5.4	1.6
Median overstatement (unweighted)	10.6	2.0	6.7	11.3	5.3	1.3
				Average Rate of Federal Income Tax, Including the EITC	Average Rate in Federal Income Tax, Plus Payroll Tax	Average Rate of Income Tax, Including Federal, State, and Local, Plus Payroll Tax

Until now, we have considered specifications in which the dependent variable is *OVERSTATEMENT*, the difference between the respondent's self-reported average income-tax rate and our estimate of the actual average income-tax rate. Of course, our estimates of the actual average tax rate are not infallible, since we have calculated them on the basis of a limited number of aspects of federal tax law, along with a number of assumptions. To investigate the extent to which the regression results in the first two columns of Table 4 are being driven by our estimates of the actual average tax rates, we repeat the regressions described earlier, with a different dependent variable. In the third and fourth columns of Table 4, we show the results of regressions using *TAX PERCENTAGE* (the respondent's self-reported average income-tax rate) as the dependent variable. These regressions allow us to investigate the relationships between the self-reported tax rates and the explanatory variables, while holding constant the true rates.

The correlation coefficient between *OVERSTATEMENT* and *TAX PERCENTAGE* is between 0.94 and 0.95 in the full sample, regardless of whether we use survey weights. In the sample of 502 observations that we use in our regressions, these correlations fall to 0.87 with weights, and 0.88 without weights.²⁶ Thus, it is not surprising that the results in the two parts of Table 4 are similar in many ways. In particular, the results for *TAX ON SIMILAR*, *TAX ASSISTANCE*, and *TAX ON HIGH INCOME* are very similar across the two specifications. The coefficients for *TAX EFFECTIVENESS* have the same sign in both parts of Table 4, although the magnitudes and significance levels of the coefficients are somewhat smaller in the third and fourth columns. These results increase our confidence that our inferences are not merely an artifact of the way in which we have constructed our estimates of the actual average income-tax rates.

In a final exploration of these relationships, we re-ran the regressions using *TAX PERCENTAGE* as the dependent variable, including our estimate of the actual average income-tax rate as an additional explanatory variable. As mentioned previously, the simple correlation between *TAX PERCENTAGE* and our estimate of the actual average tax rate is modestly positive. However, in these regressions, the coefficient on our estimate of the actual average tax rate does not come close to statistical significance, regardless of whether we use survey weights.

VI. SENSITIVITY TESTS

A. Analysis under Different Interpretations of the Dependent Variable

When we analyze *OVERSTATEMENT*, as in the preceding section, we are assuming implicitly that respondents interpreted the question in the way we intended. However,

²⁶ These high positive correlations are not surprising since *OVERSTATEMENT* is equal to *TAX PERCENTAGE* minus our estimate of the actual average income-tax rate. On the other hand, we expect the correlation coefficient between *OVERSTATEMENT* and our estimate of the actual average income-tax rate to be negative; indeed, in the full sample this correlation is -0.22 if survey weights are used, and -0.16 if they are not. In the regression sample, these correlations are -0.18 with weights and -0.13 without weights. Finally, the correlation between *TAX PERCENTAGE* and our estimate of the actual average tax rate is about 0.10 in the full sample if we use weights, and 0.17 if we do not; in the regression sample, these correlations are 0.14 with weights, and 0.21 without weights.

some respondents may have interpreted the question differently. In this section, we assess five possibilities. These are that the respondents believed they were answering a question about their

1. *marginal* tax rates in the federal income tax, excluding the EITC;
2. average tax rates for the income taxes levied by all levels of government, including federal, state, and local income taxes, excluding the EITC;
3. average tax rates in the federal income tax, *including* the EITC;
4. average tax rates for the federal income tax *and the payroll tax*, excluding the EITC; or
5. average tax rates for the income taxes levied by all levels of government, including federal, state, and local income taxes, as well as the payroll tax, excluding the EITC.

In Table 5, we show our estimates of the mean and median levels of overstatement for our base case and for the five alternatives described earlier.²⁷ In Table 6, we report the results of regression models that use different definitions of the dependent variable, based on subtracting an estimate of the respondents' actual tax rates, measured using one of the above five alternative assumptions, from the respondents' reported tax rates.

1. Respondents Believe They Are Answering a Question about Marginal Tax Rates in the Federal Income Tax

To calculate the marginal tax rates, we use much of the same methodology that was used to calculate the average tax rates. Subtracting these marginal tax rates from the self-reported tax rates, we create a variable called *OVERSTATEMENT MARGINAL*. Since the marginal tax rate exceeds the average tax rate in the U.S. federal income tax, the extent of the overstatement is lower if the respondents are assumed to have believed they were answering a question about their marginal rates. As shown in Table 5, column (2), the mean and median overstatements are reduced substantially under this assumption, but not to zero. Also, about 33 percent of respondents' self-reported tax rates are *less* than our estimate of their marginal tax rate (i.e., they have a negative value for *OVERSTATEMENT MARGINAL*), while only about 14 percent have a negative value of *OVERSTATEMENT*.

In column (2) of Table 6, we show the results from regressing *OVERSTATEMENT MARGINAL* on the same set of independent variables that we have used before. For convenience of comparison, Table 6 also includes the results from our base case, which are in column (1). The signs and significance levels of the coefficients in column (2) for

²⁷ A large percentage of taxpayers receive a refund after filing their returns. It is possible that, in answering the question about their average income-tax rate, they are thinking of the amount withheld, but ignoring the refund. This is another possible explanation for the large size of the overstatements. However, our survey did not include a question about refunds, and we are thus unable to test this explanation.

Table 6
Weighted OLS Regression Results for Effects of Taxpayer Characteristics and Attitudes on Overstatement of Tax Rates, for Assumptions about What They Believed They Were Identifying[†]

Independent Variable	(1) Base Case: Average Rate of Federal Income Tax	(2) Marginal Rate of Federal Income Tax	(3) Average Rate of Fed., State, and Local Income Tax	(4) Average Rate of Fed. Income Tax, Including EITC	(5) Average Rate of Fed. Income Tax, Plus Payroll Tax	(6) Average Rate of Fed., State, and Local Inc. Tax, Plus Payroll Tax
<i>MALE</i>	-0.800 (1.206)	-0.793 (1.265)	-0.746 (1.209)	-0.578 (1.430)	-0.164 (1.175)	-0.109 (1.179)
<i>YEARS OF AGE</i>	-0.102** (0.041)	-0.120*** (0.043)	-0.102** (0.041)	-0.107** (0.048)	0.011 (0.044)	0.010 (0.044)
<i>WHITE</i>	-0.444 (1.665)	-0.073 (1.771)	0.159 (1.657)	-1.976 (1.901)	-1.121 (1.572)	-0.518 (1.568)
<i>YEARS OF EDUCATION</i>	0.295 (0.268)	0.354 (0.277)	0.329 (0.272)	0.296 (0.311)	0.406 (0.265)	0.440 (0.268)
<i>NUMBER OF CHILDREN</i>	0.732* (0.432)	0.526 (0.476)	0.969** (0.446)	2.178*** (0.628)	0.687 (0.429)	0.923** (0.443)
<i>MARRIED</i>	4.759*** (1.212)	6.438*** (1.295)	4.926*** (1.239)	5.343*** (1.348)	4.308*** (1.180)	4.475*** (1.208)
<i>LOG OF INCOME</i>	-3.894*** (0.867)	-7.230*** (0.899)	-4.723*** (0.869)	-6.371*** (1.035)	-3.643*** (0.847)	-4.473*** (0.850)
<i>IDEOLOGY</i>	-0.399 (0.292)	-0.348 (0.302)	-0.366 (0.296)	-0.310 (0.347)	-0.270 (0.294)	-0.237 (0.297)
<i>TAX ON SIMILAR</i>	2.460*** (0.793)	2.442*** (0.822)	2.387*** (0.783)	3.023*** (0.892)	2.333*** (0.762)	2.260*** (0.755)
<i>TAX EFFECTIVENESS</i>	0.964** (0.448)	0.993** (0.463)	0.969** (0.450)	0.972* (0.524)	0.969** (0.447)	0.974** (0.450)
<i>TAX ON HIGH INCOME</i>	-1.125* (0.600)	-1.022* (0.588)	-1.128* (0.592)	-1.416** (0.641)	-1.227** (0.620)	-1.230** (0.614)
<i>TAX ON LOW INCOME</i>	0.015 (0.557)	0.447 (0.576)	0.020 (0.550)	0.295 (0.602)	-0.047 (0.551)	-0.042 (0.545)

Table 6 (Continued) Weighted OLS Regression Results for Effects of Taxpayer Characteristics and Attitudes on Overstatement of Tax Rates, for Assumptions about What They Believed They Were Identifying†

Independent Variable	(1)		(2)		(3)		(4)		(5)		(6)	
	Base Case: Average Rate of Federal Income Tax	Average Rate of Federal Income Tax	Marginal Rate of Federal Income Tax	Average Rate of Fed., State, and Local Income Tax	Average Rate of Fed. Income Tax, Including EITC	Average Rate of Fed. Income Tax, Plus Payroll Tax	Average Rate of Fed. State, and Local Inc. Tax, Plus Payroll Tax					
<i>CASH FOR POOR</i>	0.371 (0.485)	0.534 (0.498)	0.421 (0.483)	0.469 (0.543)	0.129 (0.492)	0.179 (0.490)						
<i>MILITARY SPENDING</i>	-0.010 (0.439)	0.047 (0.462)	0.003 (0.438)	0.172 (0.543)	0.023 (0.431)	0.035 (0.430)						
<i>FOREIGN AID</i>	-0.397 (0.409)	-0.341 (0.413)	-0.418 (0.410)	-0.336 (0.457)	-0.491 (0.393)	-0.512 (0.394)						
<i>SOCIAL SECURITY</i>	-0.966* (0.529)	-0.908 (0.555)	-1.032* (0.536)	-0.510 (0.596)	-1.006** (0.507)	-1.073** (0.513)						
<i>TAX ASSISTANCE</i>	2.801** (1.295)	2.587** (1.298)	2.764** (1.292)	3.023** (1.429)	2.987** (1.282)	2.951** (1.281)						
<i>SOFTWARE</i>	2.458* (1.345)	2.610* (1.351)	2.501* (1.342)	2.834* (1.506)	2.779** (1.339)	2.823** (1.339)						
<i>OWN PREPARER</i>	-0.062 (1.230)	-0.410 (1.309)	-0.174 (1.232)	-0.108 (1.423)	-0.516 (1.209)	-0.628 (1.212)						
<i>HOMEOWNER</i>	1.312 (1.848)	0.570 (1.958)	1.581 (1.842)	-0.788 (2.212)	1.540 (1.863)	1.809 (1.858)						
<i>MORTGAGE</i>	-0.083 (1.307)	-0.142 (1.370)	-0.117 (1.308)	0.311 (1.445)	-1.007 (1.271)	-1.041 (1.276)						
<i>CONSTANT</i>	17.051*** (6.298)	18.516*** (6.431)	15.386** (6.452)	24.692*** (7.373)	5.914 (6.388)	4.248 (6.538)						
No. of Observations	502	502	502	502	502	502						
R-Squared	0.2008	0.3035	0.2270	0.2983	0.1708	0.1969						
Prob. > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						

† Standard errors are in parentheses. Two-tailed significance levels are indicated as: * = 10%, ** = 5%, and *** = 1%. These regressions use 2012 tax parameters.

OVERSTATEMENT MARGINAL are the same as those in column (1) for *OVERSTATEMENT* in nearly every case, and the magnitudes of the coefficients are very similar in many cases.²⁸

2. Respondents Believe They Are Answering a Question about Federal, State, and Local Income Taxes

Michigan is one of seven states with a flat-rate income tax, in which all taxable income is taxed at the same rate, which is currently 4.25 percent. In addition, 22 cities in Michigan have income taxes of their own. Most of these have a marginal rate of 1 percent; the highest is in Detroit, with a marginal rate of 2.45 percent.²⁹ The state and city income taxes use a variety of values for personal exemptions. We use this information to create an estimate of the actual average tax rate implied by the total of income taxes paid at the federal, state, and local levels. When we subtract this estimate from the respondents' answers to the question about the percent of income paid in tax, we get *OVERSTATEMENT FEDERAL STATE & LOCAL*. The results for this variable are in column (3) of Tables 5 and 6.

The data in column (3) of Table 5 indicate that including state and local income taxes reduces the mean and median overstatements by about 4 percentage points. Comparing columns (1) and (3) of Table 6, we see that the regression results change only modestly.

3. Respondents Believe They Are Answering a Question about Federal Income Taxes, Including the EITC

If we include the EITC in the calculations, we find that a substantial number of our respondents actually have negative average federal income-tax rates — using survey weights, we estimate that 12.2 percent of the respondents are in households with an average federal income-tax rate less than zero. Thus, the EITC increases our estimates of the extent to which low-income respondents overstate their tax rates. As a result, as shown in column (4) of Table 6, both the mean and median of the overstatements are increased.³⁰

When we run the regressions using *OVERSTATEMENT INCLUDING EITC* as the dependent variable, the overall character of the results does not change. As seen in column (4) of Table 6, for most variables, the estimated coefficients are of the same sign and similar magnitude and level of significance. One exception is that the coefficient for *NUMBER OF CHILDREN* is much larger and more highly significant in

²⁸ The close correspondence between the results in columns (1) and (2) of Table 6 is probably not surprising, since our estimates of the actual *average* tax rates are linear combinations of our estimates of the actual *marginal* tax rates. The correlation between the two is greater than 0.95, regardless of whether we use survey weights, and regardless of whether we use the entire sample or the regression sample of 502 observations.

²⁹ Fewer than 15 percent of the respondents in our sample reside in a jurisdiction that levies a local income tax.

³⁰ Without the EITC, the largest overstatement is 100 percentage points. When the EITC is included, the largest overstatement is about 115 percentage points.

column (4) than in any other column in Table 6. Since the EITC is targeted primarily at low-income households with children, our calculations indicate that those with more children receive more from the EITC, which increases our estimate of the extent to which they overstate their taxes.

4. Respondents Believe They Are Answering a Question about Federal Taxes, Including the Income Tax and the Payroll Tax

The SOSS includes a variable for employment status. However, the payroll tax is levied on the *individual* worker, whereas the values of income in our data are for the *household*. While some respondents report that they are a homemaker, most of these are in households with sufficient income that it is likely that a working spouse has earnings, even if the respondent does not. Thus, we include an estimate of the payroll tax for all respondents other than those who report themselves to be retired or disabled, or who do not provide a usable answer to the question regarding employment status.³¹

If we subtract the combined income-and-payroll tax rates from the respondents' self-reported tax rates, we create a variable called *OVERSTATEMENT PAYROLL*. Column (5) of Table 5 shows that, when we include the payroll tax, the weighted average overstatement decreases to 6.5 percentage points, and the weighted median overstatement decreases to 5.4 percentage points. According to our calculations, the number who understate their taxes increases from about 14 percent to about 28 percent.

In column (5) of Table 6, we show the results from regressing *OVERSTATEMENT PAYROLL* on the set of independent variables used previously. As before, the signs and significance levels of the coefficients are the same as those in the other specifications in most cases, and the magnitudes of the coefficients are very similar in many cases.

5. Respondents Believe They Are Answering a Question about Federal, State, and Local Income Taxes, Plus the Payroll Tax

The last possibility that we investigate here, shown in column (6) of Tables 5 and 6, is that the respondents believed they were answering a question about all income taxes (federal, state, and local), as well as the payroll tax. This combines the addition of state and local income taxes (shown in column (3)) and the addition of payroll taxes

³¹ In 2012 and 2013, the employee portion of the Social Security payroll tax was levied at a rate of 6.2 percent, and the employee portion of the Medicare payroll tax was 1.45 percent. For most employees, this means that the total payroll-tax rate is 7.65 percent. Thus, for those for whom we calculate the payroll tax, we use a rate of 7.65 percent, for nine of the 11 income groups. However, the ceiling for the Social Security portion of the payroll tax was \$110,100 in 2012, and \$113,700 in 2013. Therefore, we use weighted averages of 1.45 percent and 7.65 percent for the two highest income groups. This procedure rests on the assumption that all of the income for the affected group of households comes in the form of labor earnings. If we assume that a household pays the payroll tax, but if in fact a substantial portion of the household's income does not come as labor earnings, this procedure will cause our estimate of the tax liability to be biased upward. This procedure also involves the assumption that all of the household's labor income is earned by one person. If the household has two earners, it is possible that all earnings would be taxed at 7.65 percent, even though total household earnings exceeds the ceiling.

(shown in column (5)). As shown in column (6) of Table 5, this assumption reduces the weighted mean overstatement to 2.3 percentage points, and it reduces the weighted median overstatement to 1.6 percentage points. As expected, these values are lower than those in any other specification. Nevertheless, the regression results in Table 6 remain rather consistent with what we have seen in the other specifications.

One noteworthy difference between the results including the payroll tax (columns (5) and (6) of Table 6) and the other specifications can be seen in the coefficients for *YEARS OF AGE*. In every other specification, *YEARS OF AGE* had a negative and statistically significant effect. When the payroll tax is added in, however, it reduces our estimate of the overstatement of taxes *for workers*, but not for those who are retired or disabled. According to our calculations, those who do not pay the payroll tax are older than those who do pay it, by an average of more than 20 years. As a result, columns (5) and (6) of Table 6 show that the coefficients for *YEARS OF AGE* change from negative to positive, and they fall far short of significance.³²

We have now investigated five alternative ways in which respondents could have interpreted the question differently from the way in which we wrote it. Except in the case where we include the EITC, our estimates of the mean and median overstatement are reduced. However, we still find mean and median overstatements that we consider to be fairly large in every case but one. Also, the statistical predictors of the misstatements are fairly robust.

It is important to note that each of the calculations in this section is made under the assumption that *every* respondent misinterpreted the question in exactly the same way. While we accept that *some* respondents may have interpreted the question in one of the ways that we have just discussed, we believe it is highly implausible that *all* of them did, or even that most of them did. We do not believe that when we ask several hundred people about “federal income tax,” *none* of them understands the question to be about federal income tax, while *every one* of them believes that we are asking about one of the five different definitions of tax. If one believes that some respondents interpreted the question as it was written, while others interpreted it in other ways, the mean and median overstatements would probably be somewhere between our base-case estimates of the overstatements, shown in column (1) of Table 5, and the alternatives shown in the other columns.

The conclusion from these sensitivity test results is that the statistical predictors of the overstatement of taxpayers’ perceptions of their tax rates are similar, regardless of whether we compare the self-reported tax rates with an estimate of the respondents’ actual average federal income-tax rates, with their actual marginal federal income-tax rates, or with average rates that include taxes other than the federal income tax. In particular,

³² All of the regressions reported in Table 6 use survey weights. We have also run these regressions without weights. The results for the unweighted case are available upon request. The results are similar in most cases. For *TAX ON SIMILAR*, *TAX ASSISTANCE*, *TAX EFFECTIVENESS*, and *TAX ON HIGH INCOME*, the results without weights are very similar to the results with weights.

the coefficients for *TAX ON SIMILAR*, *TAX ASSISTANCE*, *TAX EFFECTIVENESS*, and *TAX ON HIGH INCOME* are generally very similar in sign, magnitude, and significance across these specifications.

B. Additional Robustness Checks

The survey was conducted in the summer and fall of 2013, a few months after most respondents would have filed their 2012 income-tax returns. The results presented earlier are based on the tax-law parameters for 2012, but we also performed our calculations using 2013 tax law. Between 2012 and 2013, there were changes in the personal exemption and standard deduction, and in the thresholds for the various marginal tax rates. However, these changes were sufficiently small that our estimates of households' actual average tax rates changed very little. As a result, the values for *OVERSTATEMENT* changed very little, so that the regression coefficients using 2013 tax law are extremely close to the coefficients using 2012 tax law.

In the analysis so far, we chose \$300,000 as the household income in our calculations of average tax rates for the open income range (for households with income above \$150,000). We also re-ran the regressions using \$250,000 and \$350,000. The character of the results is quite similar to the results in our base case.

Finally, for the 10 closed income ranges, we selected the midpoint of the range as the household income in calculating average tax rates. In an additional set of robustness checks, we selected the income level that is 20 percent of the way from the bottom of the income range to the top, and we also selected the income level that is 80 percent of the way from bottom to top. Again, the results are quite consistent with the results in our base case.

VII. CONCLUSIONS

In this paper, we use data from a survey of the Michigan adult population to investigate respondents' beliefs about their average tax rates in the federal individual income tax. Our calculations indicate that 84.9 percent of respondents overstate their actual average income-tax rate, many by very large amounts. We estimate that the mean overstatement is 11.6 percentage points, and the median overstatement is 11.4 percentage points. Given that our estimate of the actual average income-tax rate for this sample is 13.9 percent, our results suggest an overstatement of about 83 percent, on average. The misstatements cover an astonishingly wide range, from an understatement of about 24 percentage points to an overstatement of 100 percentage points.

Regression analyses indicate that, all else equal, average income-tax rates tend to be overstated to a *greater* extent by (1) those who believe federal income taxes on households like theirs should be lower, (2) those who get tax-preparation assistance from an accountant, attorney, or advisor, and (3) those who believe federal tax dollars are spent ineffectively. We also find that average income-tax rates tend to be overstated to

a *lesser* extent by those who believe that federal income taxes on high-income households should be lower.

There are several possible explanations for the large discrepancies between the average tax rates that our respondents *say* they pay, and our estimates of how much they *actually* pay. While our survey question clearly asked about federal income-tax rates, we have investigated the possibility that the respondents misunderstood our question, and instead believed they were being asked about their marginal tax rates in the federal income tax, about their combined federal, state, and local income-tax rates, or about tax rates that included the EITC or the payroll tax. Although these different interpretations lead to different average levels of overstatement, the regressions indicate that the statistical predictors of the overstatements are fairly robust.

Another possibility, which may explain at least some of the misstatements of average tax rates, is that some respondents may suffer from severe innumeracy. In other words, when asked “What percentage of your household’s income would you say is paid in federal income tax?” some respondents may simply not have the quantitative skills that are necessary to formulate a meaningful answer.

Our result that a very large majority of our respondents believe they pay more taxes than our calculations indicate they actually pay is consistent with the results of Slemrod (2006). We believe that the implications of these findings are of considerable significance, especially as taxation continues to be the subject of active debate in the public-policy arena. One possible implication of our results is that political support for tax cuts is based, at least in part, on inaccurate perceptions of the tax system.

Our key question about the percentage of income paid in federal income tax has not been asked previously in the SOSS. Thus, we cannot explicitly test the hypothesis that perceptions of average tax rates have increased over time. Nevertheless, the overstatements that we find are larger than those found by previous studies in this literature, and our findings are consistent with the interpretation that our respondents may have been influenced by decades of statements by commentators and politicians, to the effect that U.S. tax rates are unreasonably high.

Most research papers on the economics of taxation, including many written by the authors of this paper, contain the assumption (usually implicit) that taxpayers perceive taxes accurately. However, our research suggests that this may not be the case for a large fraction of the public.³³ This has implications for our understanding of the real effects of taxes, although we urge caution in drawing strong conclusions. If taxpayers truly perceive their taxes to be higher than they actually are, it is possible that taxes will have larger real effects than they would have if the perceptions were accurate. For

³³ As mentioned earlier, we have also investigated the possibility that respondents misunderstood the question. However, we do not find that this alternative provides a great deal of comfort. If large numbers of respondents do not understand what is meant by “federal income tax,” that would seem to be nearly as problematic as it would be if (as we believe) most respondents understood the question and provided incorrect answers. Future survey researchers could ask additional questions, or provide a lengthier preamble to the question about tax rates, in an effort to increase confidence that respondents understand the question.

example, it is thus possible that the excess burden of taxation is larger than suggested by models that rely on the assumption that taxpayers' perceptions of taxes are correct (such as Ballard, Shoven, and Whalley (1985)).

However, the errors that we report here are large enough that it is possible to conclude that many taxpayers are merely in a fog about taxes. If that is the case, then a possible conclusion is that many taxpayers' behavioral responses to taxes may be quite different from the responses that would be predicted by standard models of rational behavior. In the words of an early contributor to this literature, "the ignorance appears so nearly total that one suspects taxation is treated like an act of God that has no effect on rational calculations" (Brown 1969, p. 12).

We conclude by issuing a call for three things to happen. First, we hope that our work will stimulate further research on perceptions of tax rates, and on the forces that drive those perceptions. Second, since we believe that democracies benefit from an informed public, we hope that policy makers will commit public resources more strongly to civic education. Finally, we believe that economists still have a good deal of work to do, to refine our models to account for economic agents who are poorly informed or innumerate.

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