10-15-2018

A Pilot Study of Uncertainty in Income Tax Forecasts

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Keywords

income tax, Amazon Mechnical Turk (MTurk), tax policy, Earned Income Tax Credit (EITC), tax rates

Disciplines

Finance | Finance and Financial Management | Macroeconomics | Social and Behavioral Sciences

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Abstract

How confidently can taxpayers forecast the tax bill that they will face? We asked survey respondents to provide both point estimates and subjective probability distributions of items from the tax return that they will submit the following April. In a pilot study, consisting of a sample of 188 participants from Amazon Mechanical Turk, we find evidence of substantial uncertainty over both the final tax and its determinants. We discuss the implications of this uncertainty for both tax policy and economic modeling.

Models of individual response to income taxation are critically important to economic analyses of labor supply and redistributive policy. The standard approach to modeling this response—reflected in work in the tradition of Mirrlees (1971)—assumes that taxpayers optimize based on perfect predictions of the tax consequences of their actions. For example, when applied to the consideration of a labor-supply opportunity, the model reflects a taxpayer with perfect ability to forecast the marginal tax consequences of working an extra shift.

The assumption that taxpayers are perfectly able to forecast their tax bill stands in opposition to both common intuitions and empirical evidence (for a review, see Rees-Jones and Taubinsky, 2018a). Individuals often hold mistaken beliefs about tax rates and tax schedules (Fujii and Hawley, 1988; Blaufus et al., 2013; Gideon, 2015; Feldman et al., 2016), and imperfectly approximate them by applying time-saving heuristics (Liebman and Zeckhauser, 2004; Rees-Jones and Taubinsky, 2018b). Moreover, even if one has a perfect understanding of the tax code, tax forecasts rely on values of key tax determinants which are not yet realized. For example, consider a wage-laborer deciding whether to accept an additional shift in March. An optimal decision depends on knowledge of the marginal tax rate; however, that tax rate is a function of behavior for the entire calendar year. If there is either real or perceived uncertainty in, e.g., the wages or hours offered by this employer in September, the tax-incentivized behaviors that will be pursued later in the year, or whether the laborer will change jobs before next January, then this uncertainty must carry through to uncertainty about the tax consequences of today's labor. Even if the taxpayer had encyclopedic knowledge of the tax code, assessing current tax incentives fundamentally requires forecasts of uncertain futures.

We aim to test for the presence of this type of uncertainty in tax forecasts, and to measure its magnitude. An ideal test would involve recruiting laborers like those in the example above,

facing marginal labor supply decisions in the middle of the calendar year. We would then elicit incentive-compatible forecasts of the tax consequences of these actions, complete with elicitations of uncertainty in those forecasts, to be validated against the tax bill that will be realized the following April 15th. Recruiting subjects for a study that requires the sharing of private tax records and year-long follow-up requires high stakes and major investment by the experimenters. In preparation for the deployment of such a study, we conducted an unincentivized pilot study, the results of which we report in this paper.

We asked 188 study participants, recruited through Amazon Mechanical Turk (MTurk), to forecasts the marginal tax consequences of additional earnings. We additionally elicited forecasts of the annual value of key parameters of the tax calculation, such as wages, deductions, and the Earned Income Tax Credit (EITC), and annual values of the state and federal tax bill. For each item, we elicited not only a point-estimate of the relevant value, but also the anticipated distribution of the value reflecting perceived uncertainty.

Our results suggest substantial uncertainty about values of key tax-related parameters. Averaged across all of our tax-related items, participants perceived a 33% probability that the realized values would be at least five percentage points away from their stated point estimate. Respondents appeared to understand these elicitation questions and to take them seriously, as responses exhibited other expected features of uncertain forecasts.

The uncertainty in tax forecasts has important implications for existing empirical work in economics, and for policy. Failing to account for the difficulty of forecasting tax rates may lead researchers to underestimate the elasticity of workers' preferences. Small observed behavioral responses to tax reforms (reviewed in Chetty et al., 2011) or minimal "bunching" at kinks in the tax schedule (Saez, 2010) are frequently attributed to a lack of intentional response to taxes, but

such responses can naturally arise from the uncertainty that we document. Turning to broader implications for tax policy, we note that our results help frame our understanding of the complexity of the personal income tax. Reforms aimed at simplifying the tax process typically focus on simplifying the tax schedule; however, our results suggest that such reforms may be insufficient if tax payers struggle to forecast the key determinants of the tax base. Accounting for this uncertainty may help in guiding policy makers towards tax systems that allow tax filers maximal ability to understand the connection between their actions and their taxes. Furthermore, accounting for tax filers' existing imperfect abilities may hone the accuracy of existing models of response to taxation.

1 Experimental Design

The aim of our survey was to assess people's understanding of their income tax and different tax-related items. While previous research has asked study participants to forecast these and similar items before, our goal was to measure the degree of *uncertainty* people have regarding their forecasts. To do so, we used a series of elicitations following the work of Don Moore and collaborators (see, e.g., Moore, Carter, and Yang, 2015).

We gathered information using a survey conducted on MTurk platform in July 2017.[1] The primary purpose of the survey was to elicit perceived point estimates and subjective probability distributions for several tax-relevant parameters, long before the end of the tax year at which time those parameters are finalized. Figure 1 displays an example question eliciting such a point

[1] We adopt standard recommended practices for MTurk surveys, including a required comprehension check. Those who fail are excluded from the survey.

estimate and probability distribution—we used this example as a comprehension check for our survey. Screenshots of the full survey instrument are available in the appendix.

We asked participants to report point estimates and subjective probability distributions for several tax-relevant parameters: total income, salary and wage income, federal income tax, and state income tax. In each case, participants predicted the value (in dollars) that would be reported for the 2017 tax year, as would be finalized in the tax season of 2018.

Since the subjective probability distributions over tax parameters are a key object of interest, we describe this elicitation in some detail. After reporting a point estimate for each tax parameter, participants faced a screen which displayed their point estimate, followed by a series of sliders, each associated with a range into which the value might fall. Participants could adjust each slider to indicate the probability that their point estimate would fall within a given range. The available bins were the following:

1. Less than [*80% of point estimate*]
2. [*80% to 90% of point estimate*]
3. [*90% to 95% of point estimate*]
4. [*95% to 99% of point estimate*]
5. [*99% to 100% of point estimate*]
6. [*100% to 101% of point estimate*]
7. [*101% to 105% of point estimate*]
8. [*105% to 110% of point estimate*]
9. [*110% to 120% of point estimate*]
10. Greater than [*120% of point estimate*]

Text within brackets was dynamically updated to reflect the numerical values corresponding to the italicized range above, based on the participant's reported point estimate. An example is displayed in Figure 2, for the hypothetical case where a respondent reports a point estimate of $1,000.

For total income, salary and wage income, federal income tax, and state income tax, we asked participants for their point estimates and subjective probability distributions. These elicitations were followed by a series of binary questions regarding key features of the final tax bill. Specifically, we asked:

1. If you were to receive $100 more in wage or salary income in 2017, do you predict you would owe more or less in total federal taxes?
2. When you file your federal income tax forms for 2017, do you predict you'll owe a balance due, or do you predict you'll be owed a refund due to overpayment?
3. Do you predict you'll itemize deductions in 2017?
4. Do you predict you'll qualify for the EITC in 2017?

After each binary question, we elicited the participant's degree of certainty in her response to that question, using a slider interface like the one described above. We then elicited point estimates and subjective probability distributions about each of these parameters, depending on each respondent's answer to the binary questions above. First, we asked how much more or less would be owed in federal taxes (depending on each respondent's answer to the Question 1) following a $100 increase in income. Second, how much each respondent expected to pay or receive (depending on their answer to Question 2) after filing taxes. Finally, we asked for their anticipated amount of itemized deductions and EITC, when relevant based on Questions 3 and 4.

We also asked participants about their anticipated tax filing status for 2017, and their expected number of deductions. Specifically, we first asked whether they expected to file and offer participants the option of selecting "Single," "Married filing jointly," "Married filing separately," "Head of household," and "Qualifying widow(er) with dependent child." We then asked participants to predict the number of dependents they expected to claim on their 2017 tax return.

2 Sample and Data Construction

We collected data on July 20, 2017. Restricting our sample to complete responses among eligible participants, we arrived at a sample of 209 observations.[2] Of the 209 observations, only 188 passed the comprehension check, yielding a 90% pass rate. Our baseline sample consists of these 188 observations.

In Table 1, we present a few descriptive statistics of tax-related items, comparing sample averages with population averages. Reported population averages come from the IRS's most recent published statistics in 2016. For number of dependents, our sample average is 0.46 (SE = 0.07; median = 0). (For comparison, the U.S. population average is 0.63 dependents—see Table 1). For tax status, we find that our sample is disproportionately single compared to the population average. Whereas we find that only 48% in the U.S. population hold the tax status of single, in our sample, 70% hold the tax status of single (Table 1).

We report raw averages of point estimates for all responses, with the following exceptions. First, for the question about how much more/less participants anticipate being taxed if given $100,

[2] We collected 200 MTurk HITs, for which we paid $2 each. We restrict to completed responses, and to the first response from each MTurk Worker ID.

when calculating the average, we set any value greater than $100 equal to $100. Second, for the average point estimate regarding refunds and balances owed, we restrict to estimates of refunds that are greater than or equal to zero, and estimates of balances owed that are less than or equal to zero.[3] For all figures, sample restrictions are explained in detail in the figure notes.

3 Main Results

We find that participants exhibited substantial uncertainty about their upcoming tax bill. Moreover, participants were uncertain not only about their final tax bill, but of the tax determinants that would allow one to make an accurate forecast in the first place. For example, on average, participants perceived only a 49% probability that their actual total income will be within one percent of their point estimate. In light of this uncertainty about the parameters which determine one's tax bill, we are better able to understand the source of participants' uncertainty about their final tax bill amount itself.

3.1 Total Income

The average point estimate for total income in our sample is $39,700 (SE = 2,464). (For comparison, the U.S. population average is $70,554—see Table 2). The median point estimate is $35,000. Figure 3a displays a histogram of these point estimates. (All such histograms are winsorized at the 5th and 95th percentiles).

As expected, participants reported higher probability densities close to their point estimates, with certainty falling steadily as we move away from the point estimate. Figure 4a reports these results. In general, participants believed it more likely that their point estimate will

[3] Note that these zeroes do not overlap. Prior to asking for participants' point estimates, we ask whether participants anticipate to owe a balance or to be owed a refund. If a participant self-reports a zero, we continue to respect the participants' self-reported anticipated tax balance/refund.

turn out to be above their realized total income, rather than below. This finding is consistent with greater perceived probability of income-reducing shocks (such as job loss) than income-augmenting shocks. On average, participants perceived a 29% probability that their total income would lie between 99% and 100% of their point estimate, and they perceived a 20% probability that their total income would lie between 100% and 101% of their point estimate.

3.2 Salary and Wage Income

The average point estimate for salary and wage income in our sample average is $33,825 (SE = 3,061) (For comparison, the U.S. population average is $49,061—see Table 2). The median point estimate is $29,000. Figure 3b displays a histogram of these point estimates.

As expected, participants reported higher probability densities close to their point estimates, with certainty falling steadily as we moved away from the point estimate. Figure 4b reports these results. In general, participants believed it more likely that their realized wage and salary income would fall below their point estimate, rather than above. This finding is consistent with greater perceived probability of income-reducing shocks than income-augmenting shocks. On average, participants perceived a 34% probability that their salary and wage income is between 99% to 100% of their point estimate and a 20% probability that their salary and wage income is between 100% to 101% of their point estimate. On average, participants perceived a 20% probability that their salary and wage income would be less than 95% of their point estimate and a 5% probability that their salary and wage income would be greater than 105% of their point estimate.

3.3 Federal Income Taxes

The average point estimate for federal income tax in our sample average is $5,022 (SE = 467). (For comparison, the U.S. population average is $10,230—see Table 2). The median point estimate is $3,000. Figure 3c displays a histogram of these point estimates, while Figure 4c reports the average of subjective probability distributions.

Consistent with skewed subjective distribution of predicted income, participants believed it more likely that their realized federal income tax would fall below their point estimate, rather than above. On average, participants perceived a 25% probability that their federal income tax would be between 99% to 100% of their point estimate and 19% probability that their federal income tax would be between 100% to 101% of their point estimate.

However, unlike in the case of predicted income, we find an interesting and important contrast in the perceived probability density over predicted taxes: participants report substantial perceived probability that their tax bill will be far below their point estimate. Specifically, participants perceived a 12% probability that their federal income tax lies between 80% to 90% of their point estimate, but only a 9% probability that it would lie between 90% to 95% of their point estimate. On average, participants perceived a 29% probability that their federal income tax would be less than 95% of their point estimate and a 6% probability that their federal income tax would be greater than 105% of their point estimate.

3.4 State Income Taxes

The average point estimate for state income tax in our sample is $1,895 (SE = 326) (For comparison, the U.S. population average is $2,791—see Table 2).[4] The median point estimate is

[4] For this statistic, we turn to Piketty, Saez, Zucman (2018). They report in their online appendix the total amount of state and local income taxes paid. Since this data only extends to 2015, we use the value in 2015, adjusting it to 2017 dollars. We then divide the gross adjusted amount of state and local income taxes paid by the number of tax returns filed in 2015, which we pull from the IRS SOI.

$500. Figure 3d displays a histogram of these point estimates (winsorized at the 5th and 95th percentiles), and Figure 4d reports the average of subjective probability distributions. These results parallel those for federal income taxes: participants believed it more likely that their realized state income tax would fall below their point estimate, rather than above. As with the federal income taxes, participants report substantial likelihood of a much lower state tax bill than their estimate. On average, participants perceived a 37% probability that their state income tax would be less than 95% of their point estimate and a 6% probability that their state income tax would be greater than 105% of their point estimate.

3.5 Itemized deductions

We can explore the source of the notable downward uncertainty in respondents' predicted tax bills by looking into their forecasts of deductions and credits. We first consider the case of itemized deductions. The average point estimate for itemized deductions, conditional on claiming, in our sample is $10,881 (SE = 5,088). (For comparison, the U.S. population average conditional on claiming itemized deductions is $29,260—see Table 2). The median point estimate is $4,200. Figure 3e displays a histogram of these point estimates, while Figure 4e reports average subjective probability distributions. On average, participants perceived a 31% probability that their itemized deduction would be between 99% to 100% of their point estimate and a 22% probability that their itemized deduction would be between 100% to 101% of their point estimate.

3.6 EITC

The average point estimate for Earned Income Credit (EITC), conditional on anticipated claiming, in our sample is $1,314 (SE = 270). (For comparison, the U.S. population average, conditional on claiming the EITC, is $2,489—see Table 2). The median point estimate is $500.

Figure 3f displays a histogram of these point estimates, while Figure 4f displays the average subjective probability distribution.

The EITC perceived probability distributions exhibit a notable feature which helps explain the degree of uncertainty in respondents' anticipated tax bills: respondents report a substantial perceived probability of receiving "Less than 80%" of their anticipated EITC point estimate. Consistent with this uncertainty, the subjective probability distribution over EITC amounts is heavily left skewed. On average, participants perceived a 29% probability that their EITC would be less than 95% of their point estimate and a 9% probability that their EITC would be greater than 105% of their point estimate.

Uncertainty over anticipated EITC receipts is notable for two reasons. First, this uncertainty appears to be a substantial driver of overall uncertainty about one's final tax bill (Figure 5). That helps identify the sources of uncertainty in the existing tax code, as well as the populations on which this uncertainty is concentrated: low-income households with children. Second, this EITC uncertainty is notable because it operates in the opposite direction from uncertainty over total income. Most households in our sample who anticipate receiving the EITC have incomes in the phase-out region of the credit (their average point estimate for total income is $32,220, SE = $41,640). Therefore, the downward income uncertainty displayed in Figure 4b should correspond to a high perceived probability of a *larger-than-expected* EITC. The fact that the EITC probability distribution is skewed left, rather than skewed right, therefore suggests either that respondents do not understand the mapping between income and their EITC amount, or that some other source of uncertainty (e.g., about filing status or number of claimed dependents) is driving their uncertainty about the EITC.

3.7 Impact on taxes from receiving $100 more in salary or wages

As described at the beginning of this section, to understand respondents' beliefs about their anticipated marginal tax rate, we asked them to predict how much their total tax bill would change if they received $100 more in salary or wages.[5] (For this analysis, we limit the implicit marginal tax rate to 100%, recoding the 26 responses which exceeded $100 as exactly $100.) The average point estimate for anticipated impact on taxes in our sample is $27 (SE = 2). (For comparison, the U.S. population average is $15—see Table 2).[6] The median point estimate is $15. Figure 3g displays a histogram of these point estimates, and Figure 4g reports the average subjective probability distribution. In general, participants believed it more likely that their marginal tax rate will fall below their point estimate, rather than above. On average, participants were remarkably confident about their marginal tax rate predictions, particularly in light of previous evidence documenting widespread misperceptions of marginal tax rates (see Rees-Jones and Taubinsky 2018a, and citations therein). On average, participants perceived a 24% probability that their actual change in tax would be between 99% to 100% of their point estimate and a 22% probability that their rise in tax would be between 100% to 101% of their point estimate. On average, participants perceived a 26% probability that their actual change in tax would be less than 95% of their point estimate and an 8% probability that their actual change in tax would be greater than 105% of their point estimate.

3.8 Balance or refund?

In our sample, 47% of respondents believe they will face a balance due, while the rest predict they'll be owed a refund. Averaging across these two groups, the average point estimate

[5] In other words, our sample average averages the absolute value of any reported change rather than estimating the net average reported change. For example, if our sample had only two people one anticipating $100 more and the other $100 less in taxes, our average anticipated change is $100 (not $0).

[6] We draw this population value from CBO (2005). The CBO reports the full distribution of the average marginal tax rate across incomes. We use the median reported marginal tax rate which is 15% (i.e., $15 out of $100).

for net taxes owed is $152 (SE = 269). (For comparison, the U.S. population average for $2,818; see Table 2). The median point estimate is -$37.50. Figure 3h displays a histogram of these point estimates, and Figure 4h displays the average of respondents' subjective probability distributions.

Participants' uncertainty over their total tax bill, and in particular their EITC amount, again shows up in their reported subjective probabilities about their anticipated refund or balance due. On average, participants perceived a 25% probability that their actual refund, balance owed, amount would be less than 95% of their point estimate and a 7% probability that their actual refund, balance owed, amount would be greater than 105% of their point estimate.

4 Discussion

Although tax complexity and misperceptions have been the topic of substantial study, the topic of *uncertainty* about one's tax bill has been relatively neglected. Such uncertainty muddies the relationship between actions and their perceived tax implications, altering the interpretation of economic studies of taxpayer responses, for example in the bunching literature, and possibly undermining the ability for tax policies to alter behavior. In this paper, we present pilot evidence documenting the substantial uncertainty U.S. taxpayers face regarding their total tax bill, and uncovering some possible factors which contribute to that uncertainty. In particular, we find substantial uncertainty about income, particularly with regard to negative income shocks. Moreover, we find additional uncertainty about one's tax bill which appears largely driven by uncertainty about deductions and credits, and the Earned Income Tax Credit in particular. Our results highlight the need for accommodating this uncertainty in policy analysis, and encourage the further study of this phenomenon through larger-scale, more representative, and incentivized means.

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Table 1—Summary Statistics

	Sample	Population
Average Number of dependents	0.46	0.63
	(0.07)	
Median Number of dependents	0	
Tax Status (Proportion of Sample)		
Head of household	9.04%	14.41%
Married filing jointly OR Qualifying widow(er)	20.74%	36.02%
Married filing separately	0.53%	2.04%
Single	69.68%	47.52%
Passed Comprehension Check	89.95%	

Notes: This table reports basic descriptive statistics on our sample, compared where possible to a population average. Statistics are constructed using only observations who passed the comprehension check (N = 188), except when reporting the comprehension check pass rate. Population averages are collected from the IRS website, using their most recently published statistics in 2016.[7]

[7] https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-returns-publication-1304-complete-report

Table 2 – Sample Point Estimates, Certainty of Response, and Population Averages of Tax-Related Measures

	Average	Population Average		Proportion who responded	Total Average Certainty	Certainty by Response
Total Income	$39,700	$70,554				
	(2,465)					
Income from Salary or Wages	$33,825	$49,061				
	(3,061)					
Federal Income Taxes	$5,022	$10,230				
	(467)					
State Income Taxes	$1,895	$2,791				
	(326)					
Total of Itemized Deductions	$10,881	$29,260	*Will itemize deductions*	20.7%		82.1%
(Conditional on claiming)	(5,088)				79.0%	(3.9)
			Will not itemize deductions	79.3%	(2.2)	78.2%
						(2.6)
Total Earned Income Credit	$1,314	$2,489	*Will qualify for EIC*	23.9%		85.0%
(Conditional on claiming)	(270)				77.4%	(3.2)
			Will not qualify for EIC	76.1%	(2.2)	75.0%
						(2.7)
Change in Taxes from $100	$27	$15	*Will be taxed more*	89.4%		70.1%
	(2)				68.3%	(2.4)
			Will be taxed less	10.6%	(2.3)	52.9%
						(8.4)
Balance/Refund Owed	-$152	$2,818	*Will owe balance*	46.8%		70.7%
	(269)				71.6%	(3.0)
			Will be owed a refund	53.2%	(2.0)	72.5%
						(2.8)

Notes: This table reports participants' forecasts of a series of tax-related measures. Population averages are collected from the IRS website, using their most recently published statistics in 2016.[8] All IRS data is originally reported in 1990 U.S. dollars, and is converted using the CPI-U into 2017 dollars (the year we completed this study).[9] For itemized deductions, EITCs, change in taxes from $100, and balance/refund owed, we asked a question with a bifurcated answer (e.g., Do you believe that you will itemize your deductions? Will you owe a balance or be owed a refund?). In those cases, we record the proportion of participants who respond to either answer, participants' average total certainty in their response, and participants' average certainty by response. Standard errors are reported in parentheses.

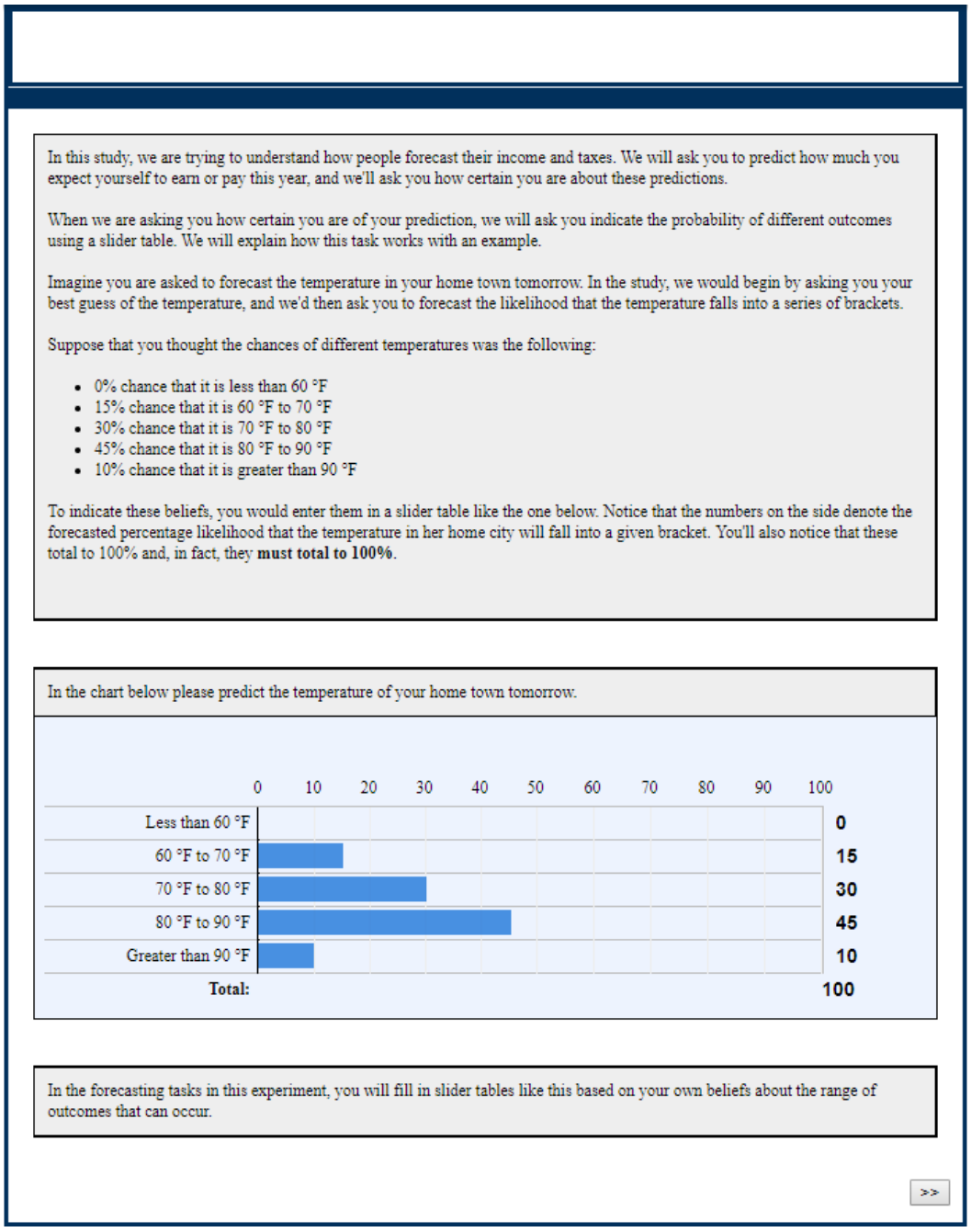
To calculate population state income tax, we turn to Piketty, Saez, Zucman (2018). They report in their online appendix the total amount of state and local income taxes paid. Since this data only extends to 2015, we use the value in 2015, adjusting it to 2017 dollars. We then divide the gross adjusted amount of state and local income taxes paid by the number of tax returns filed in 2015, which we pull from the IRS SOI.

[8] https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-returns-publication-1304-complete-report
[9] CPI-U 1990: 130.7; CPI-U 2017: 245.12

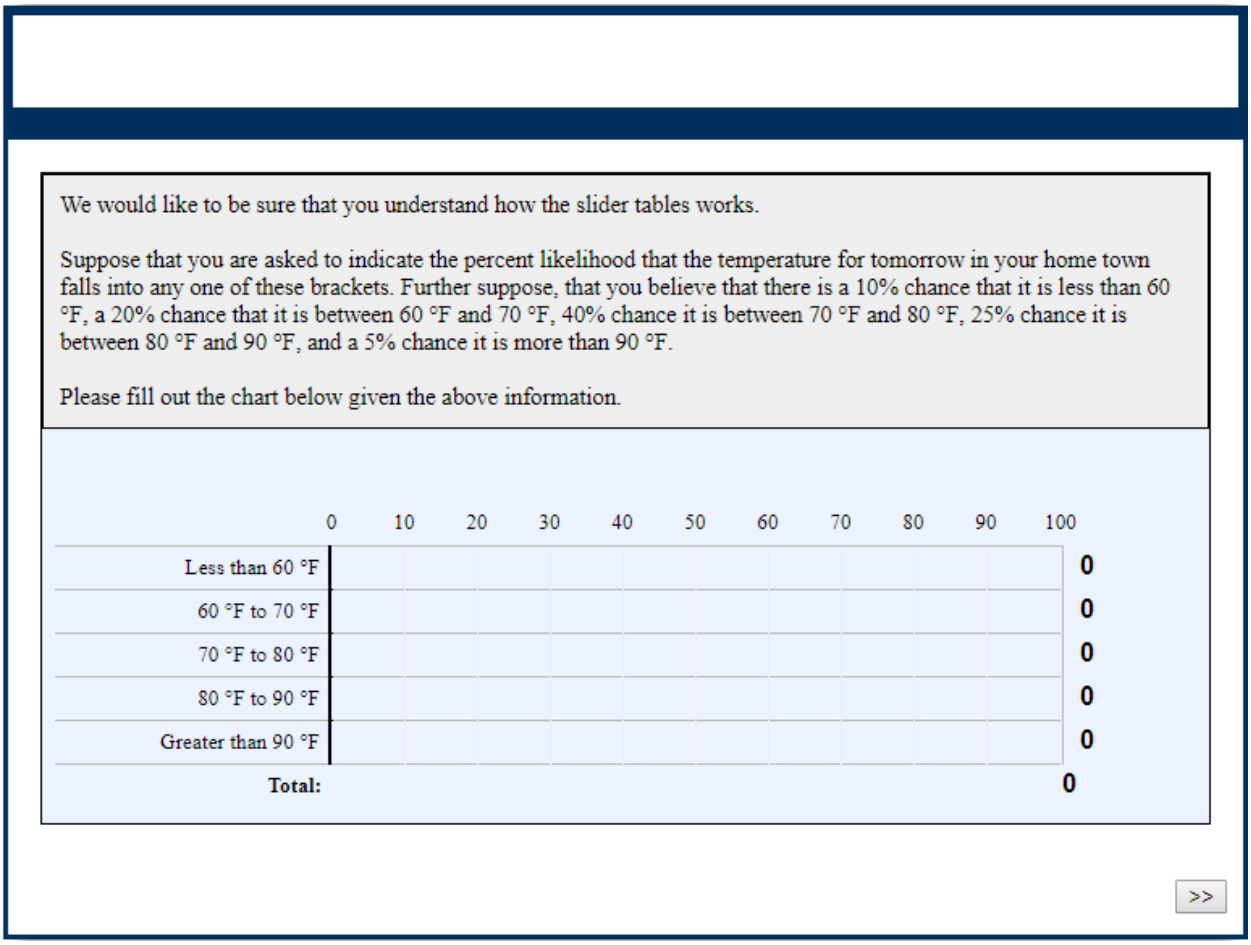
To calculate population change in tax from an additional $100, we draw from CBO (2005). The CBO reports the full distribution of the average marginal tax rate across incomes. We use the median reported marginal tax rate which is 15% (i.e., $15 out of $100).

Figure 1 – Comprehension Check

Page 1

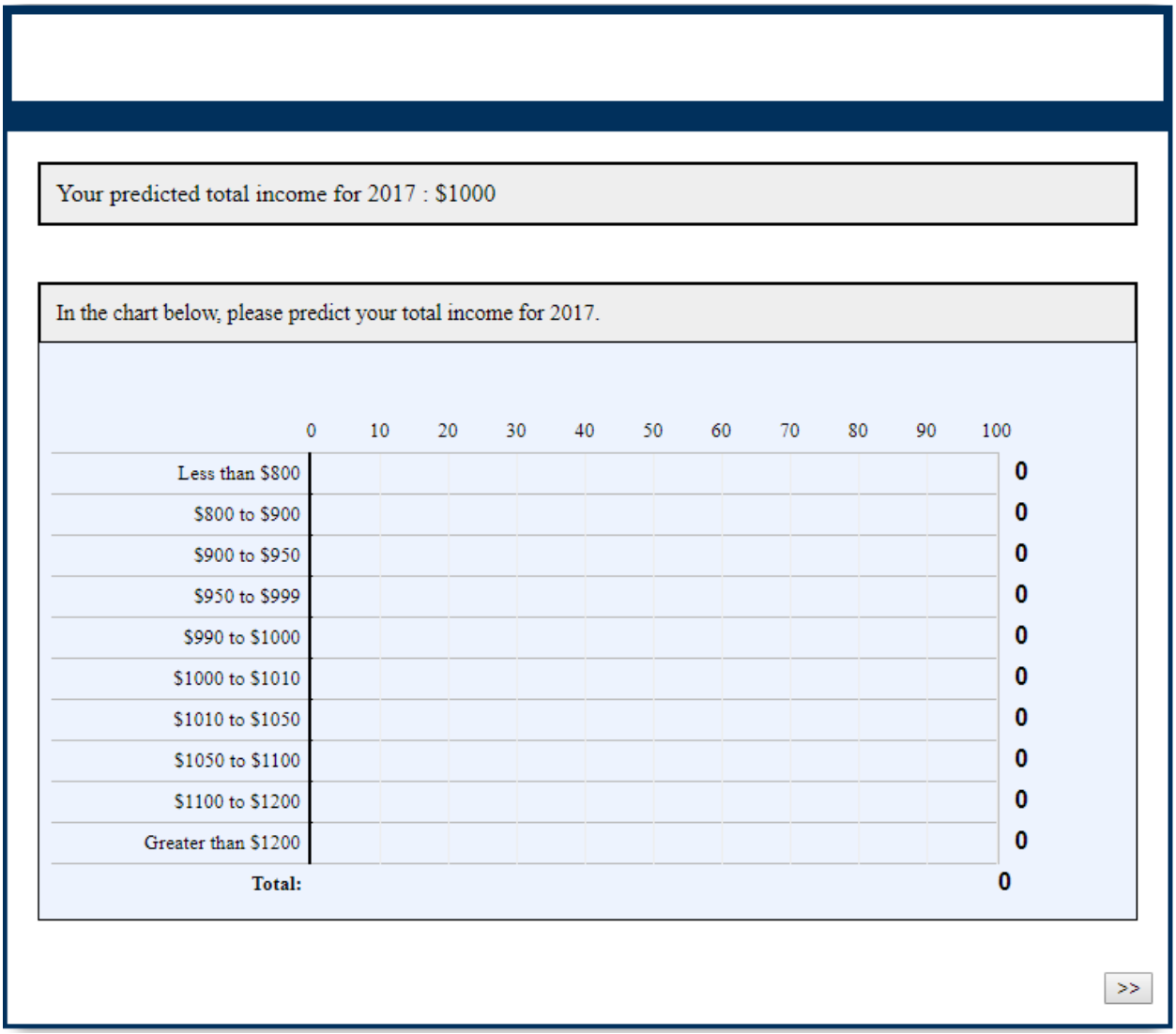


Page 2



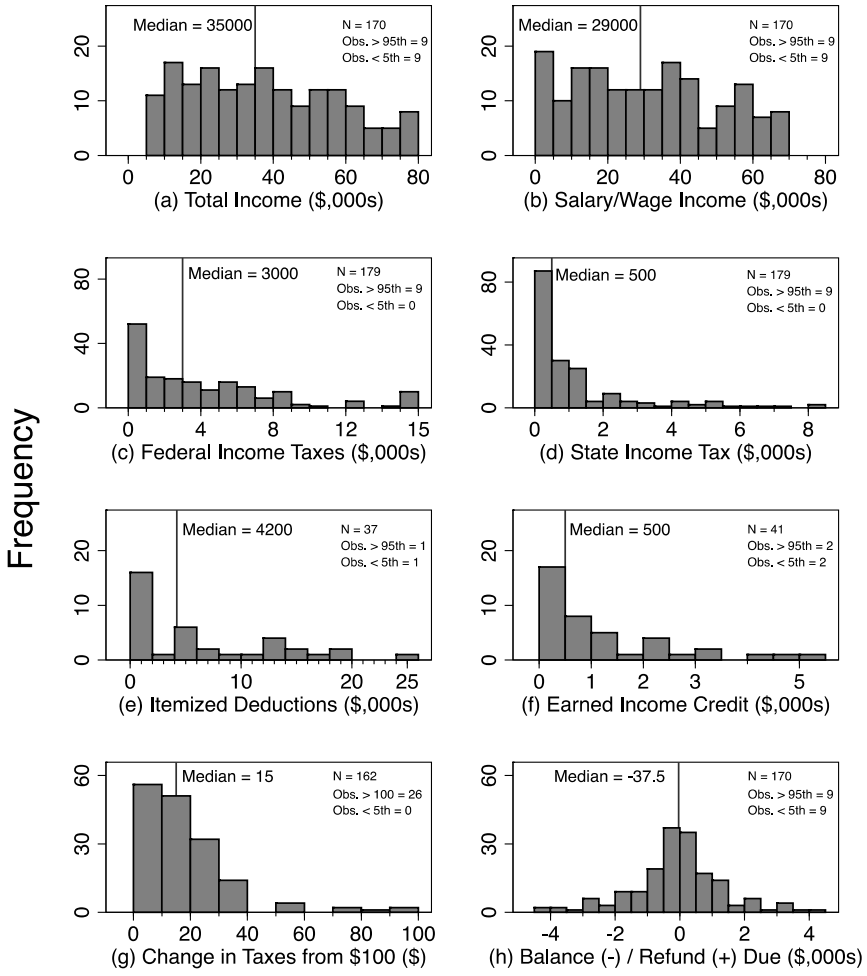
Notes: For our comprehension check, we have two separate screens. In the first screen, we describe to participants the kind of elicitation task that they can expect to complete. We use a non-tax related subject (temperature) as our example. In our example, we present a correctly completed elicitation task. In the second screen, we present a similar example as was just seen, but with different numbers. We ask participants to drag the sliders into the correct positions. Any mistake results in failure of the comprehension check and ejection from the survey.

Figure 2 – Eliciting Uncertainty in Forecasts



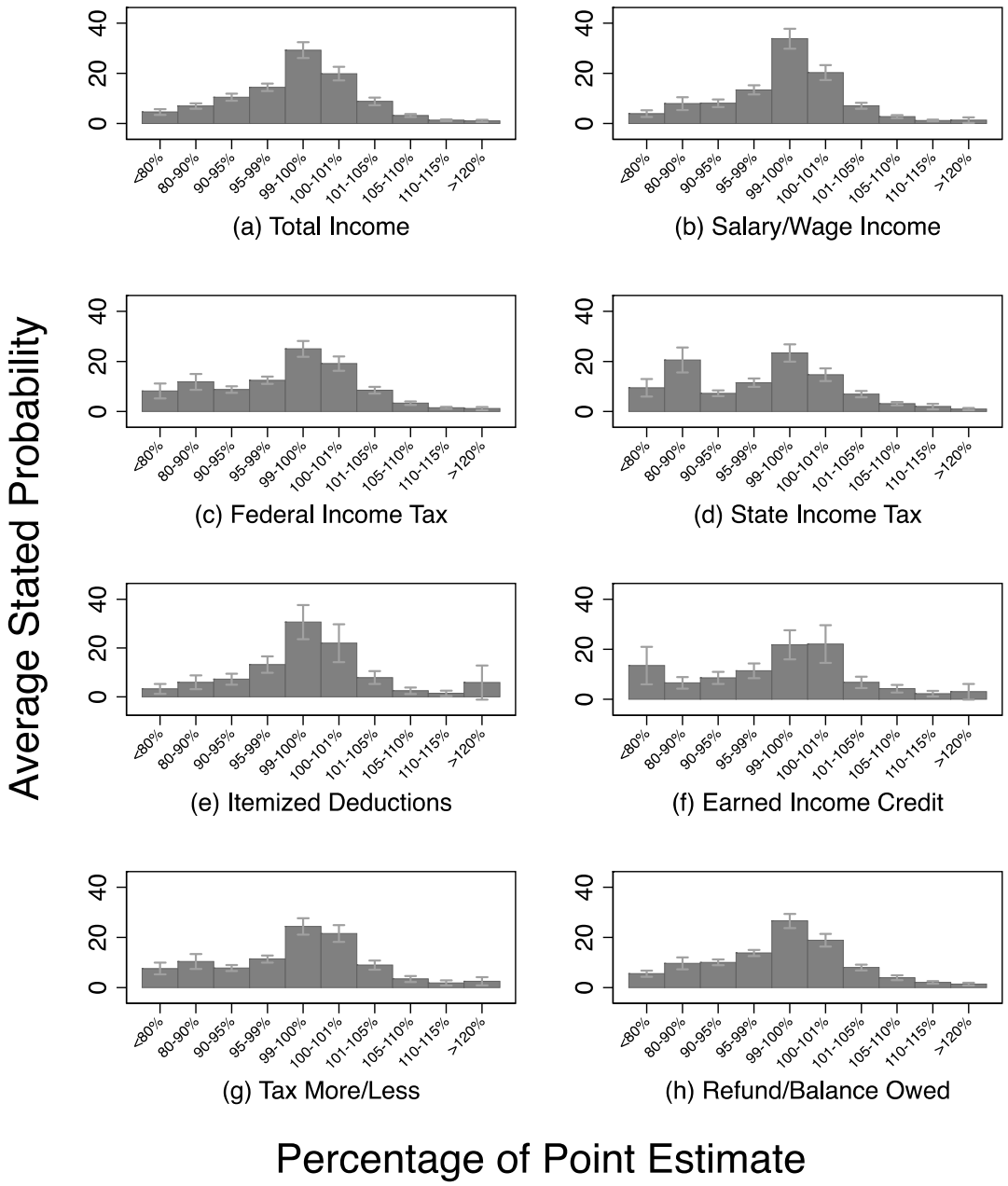
Notes**:** This figure presents an example of our elicitation of uncertainty in forecasts of total income. This elicitation would immediately follow the participant indicating their point-estimate of their total income, which in this example was $1,000. In the first text box, we remind the participant of her answer to the point estimate question. In the elicitation task below the reminder, we automatically update the bins on the left-hand side based on the participant's response to the point estimate question. Bins range from less than 80%, 80% to 90%, 90% to 95%, 95% to 99%, 99% to 100%, 100% to 101%, 101% to 105%, 105% to 110%, 110% to 120%, and greater than 120% of the point estimate. Bold numbers on the right-hand side automatically adjust to inform the participant of the exact location of their slider. The reported probabilities (i.e., the values each slider takes) must sum to 100.

Figure 3 – Frequency Histogram of Tax-Related Measures



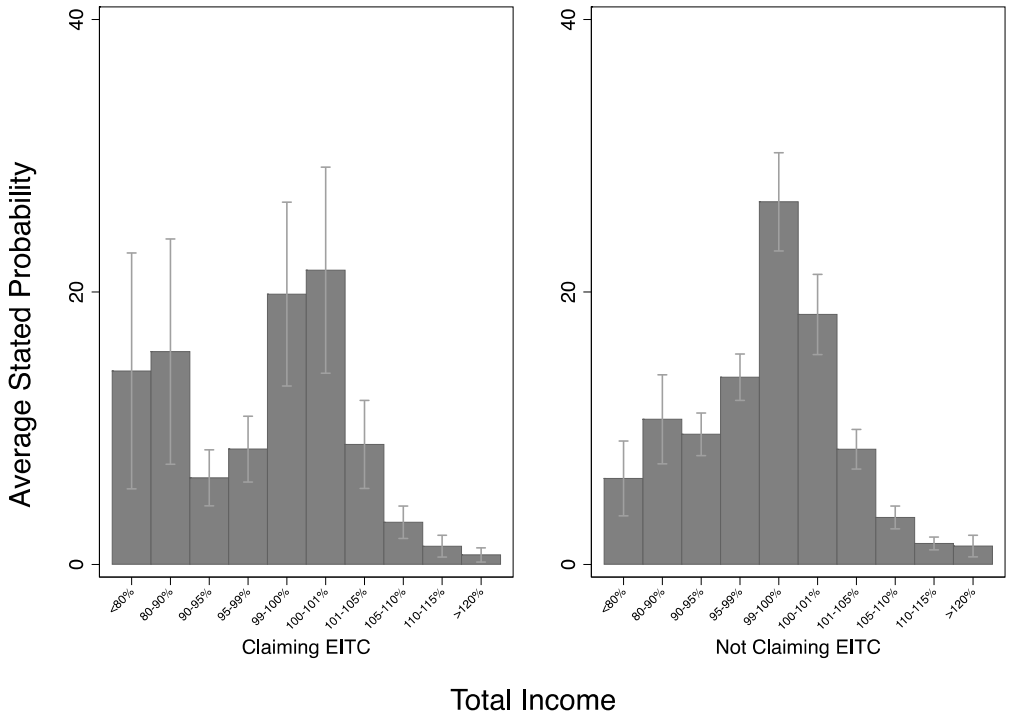
Notes: This figure displays histograms of point estimates for each of our tax-related measures. The x-axis displays dollar values. The y-axis displays frequency. For each histogram, we mark the median with a vertical line. For each histogram, we only display observations between the 95th and 5th percentile. In the upper-right hand corner, we display the number of observations dropped that are above the 95th percentile and below the 5th percentile; we additionally display the remaining sample. For itemized deductions and EITCs, the sample is restricted to those who affirmed that they were claiming itemized deductions or the EITC, respectively. For the histogram measuring the change in taxes from $100, rather than drop any observations above the 95th percentile, we drop any observations greater than $100.

Figure 4 – Average Stated Probability of Tax-Related Measures



Notes: In Figure 4, we measure the average stated probability that the actual value of a tax-related measure falls into bins that move progressively and incrementally further from the participant's point estimate. In this case, histograms (a) – (d), (g), and (h) contain the full sample of 188 observations. Histogram (e) contains a sample of 39. Histogram (f) contains a sample of 45. The x-axis measures the percent distance from the point estimate. The y-axis measures the average stated probability. Standard error bars are marked for each bin in gray capped lines.

Figure 5 – Average Stated Probability of Federal Income Tax Conditional on Claiming EITC

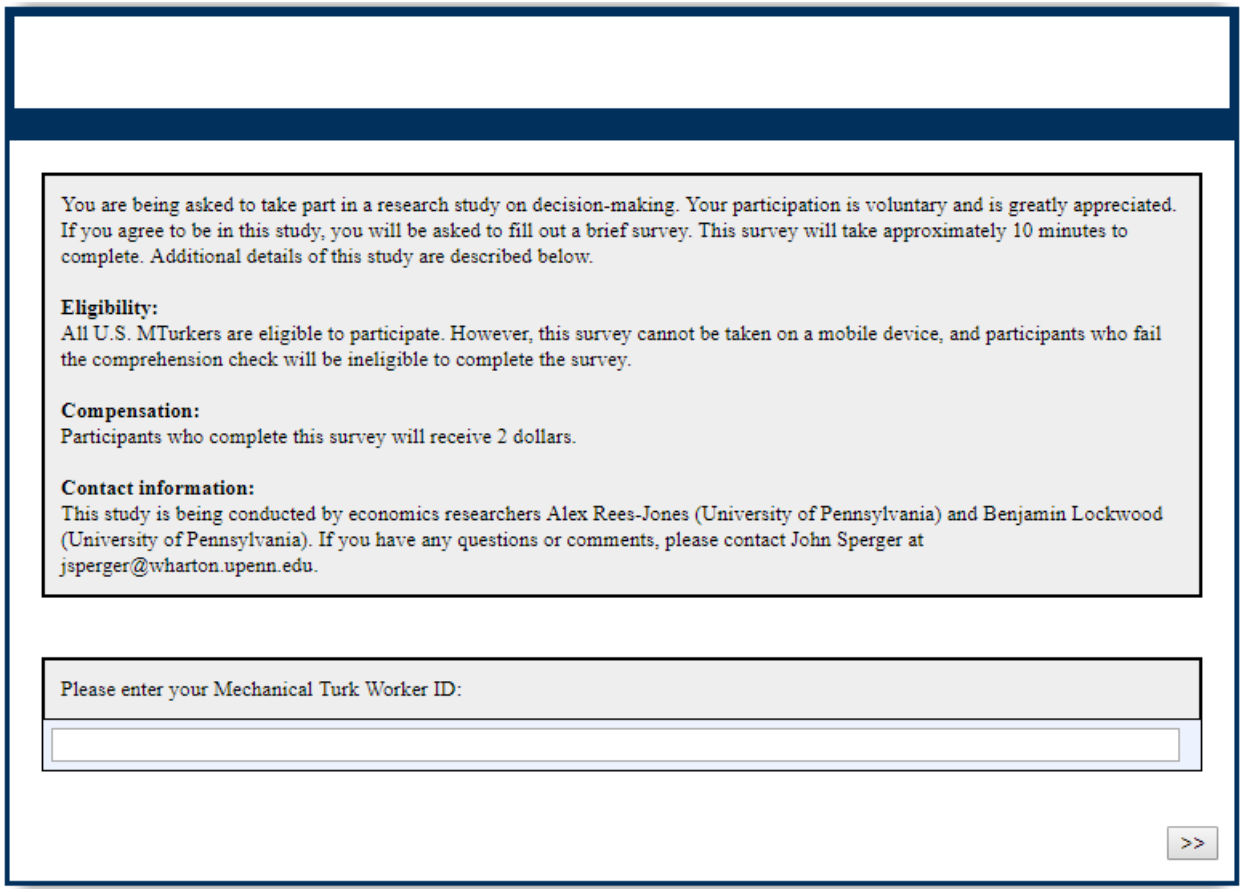


Notes: In the following figure, we take Panel (A) in Figure 4 and separate it into two graphs. On the left is the subjective probability distribution of total income for those who believe that they will claim the EITC. On the right is the probability distribution of total income for those who believe they will not claim the EITC. The x-axis measures the percent distance from the point estimate. The y-axis measures the average stated probability. Standard error bars are marked for each bin in gray capped lines.

Appendix

A Survey Screenshots

Intro



Comprehension Check—page 1

In this study, we are trying to understand how people forecast their income and taxes. We will ask you to predict how much you expect yourself to earn or pay this year, and we'll ask you how certain you are about these predictions.

When we are asking you how certain you are of your prediction, we will ask you indicate the probability of different outcomes using a slider table. We will explain how this task works with an example.

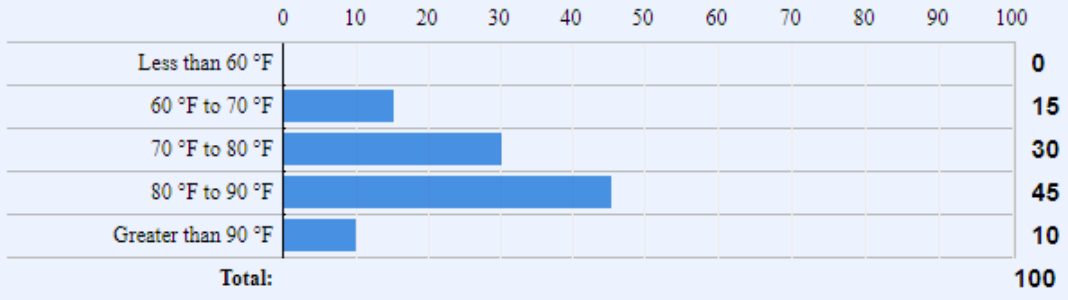
Imagine you are asked to forecast the temperature in your home town tomorrow. In the study, we would begin by asking you your best guess of the temperature, and we'd then ask you to forecast the likelihood that the temperature falls into a series of brackets.

Suppose that you thought the chances of different temperatures was the following:

- 0% chance that it is less than 60 °F
- 15% chance that it is 60 °F to 70 °F
- 30% chance that it is 70 °F to 80 °F
- 45% chance that it is 80 °F to 90 °F
- 10% chance that it is greater than 90 °F

To indicate these beliefs, you would enter them in a slider table like the one below. Notice that the numbers on the side denote the forecasted percentage likelihood that the temperature in her home city will fall into a given bracket. You'll also notice that these total to 100% and, in fact, they **must total to 100%**.

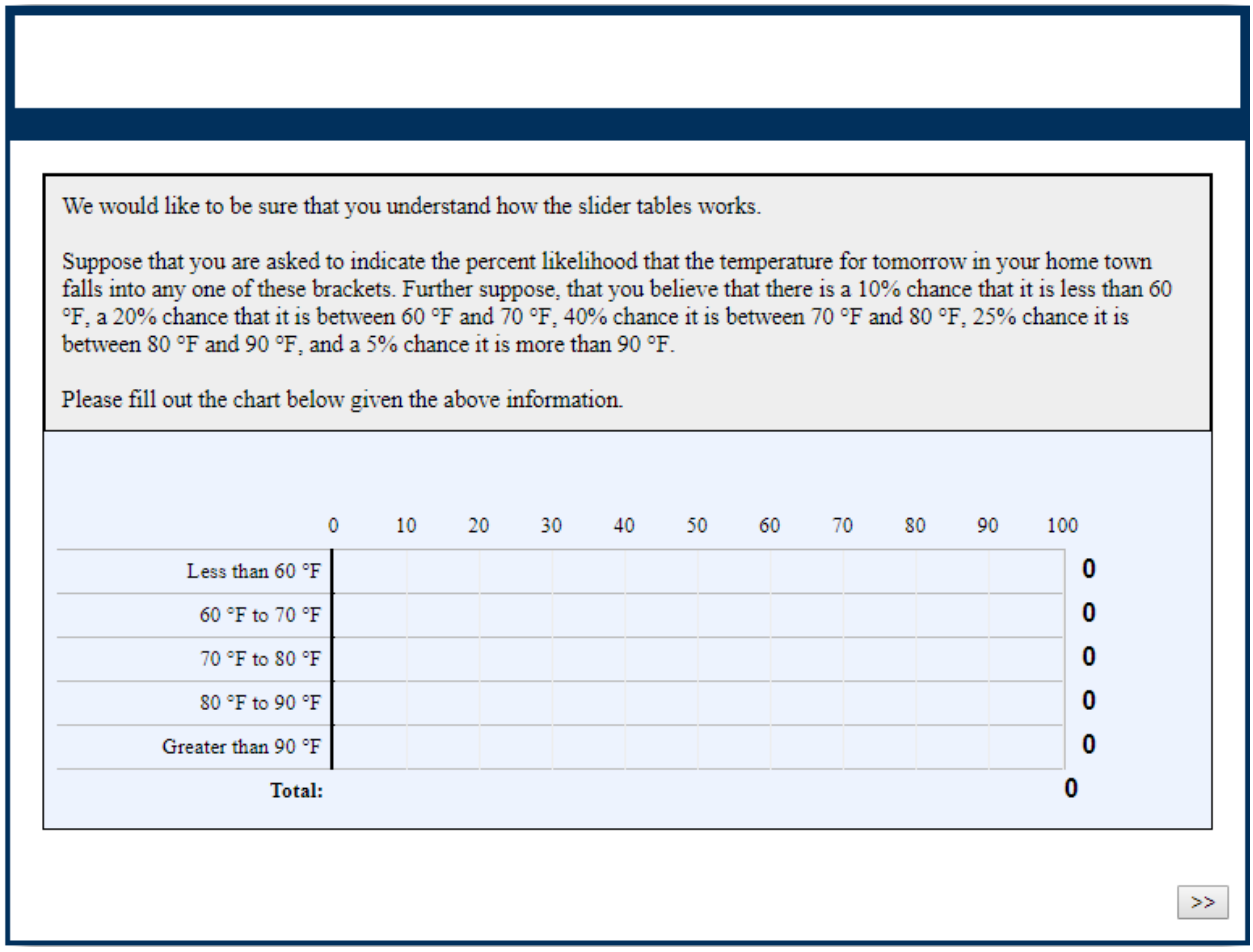
In the chart below please predict the temperature of your home town tomorrow.



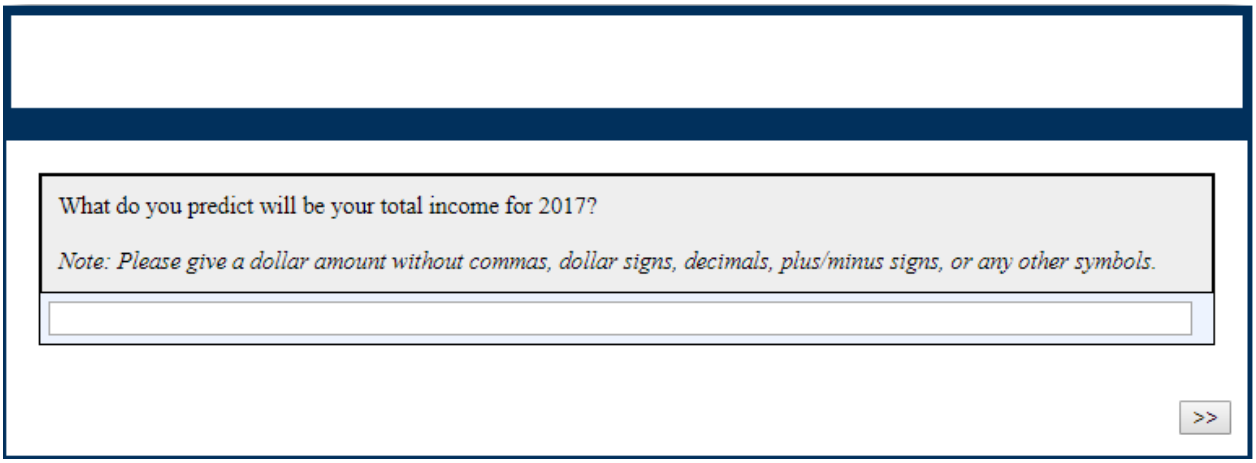
In the forecasting tasks in this experiment, you will fill in slider tables like this based on your own beliefs about the range of outcomes that can occur.

>>

Comprehension Check—page 2



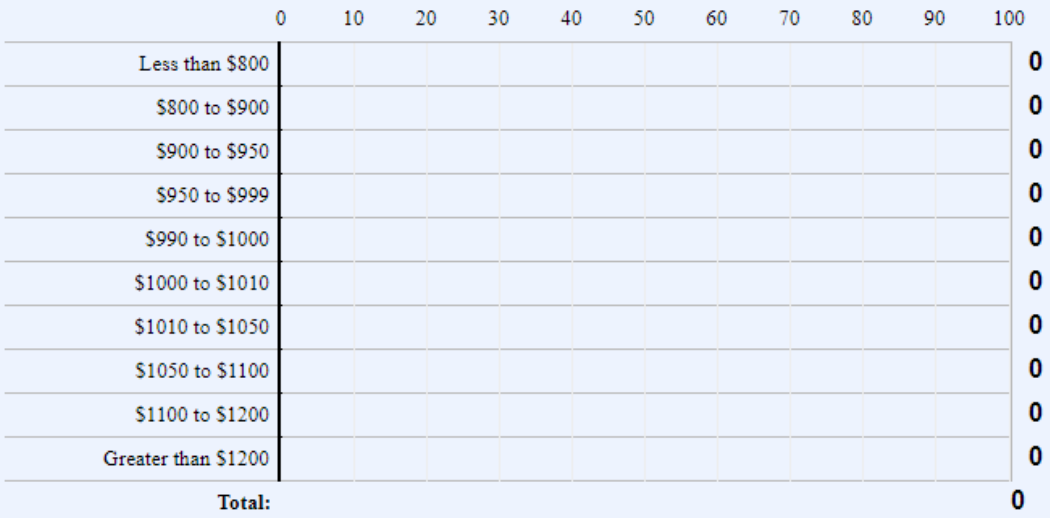
Total Income—page 1



Total Income—page 2

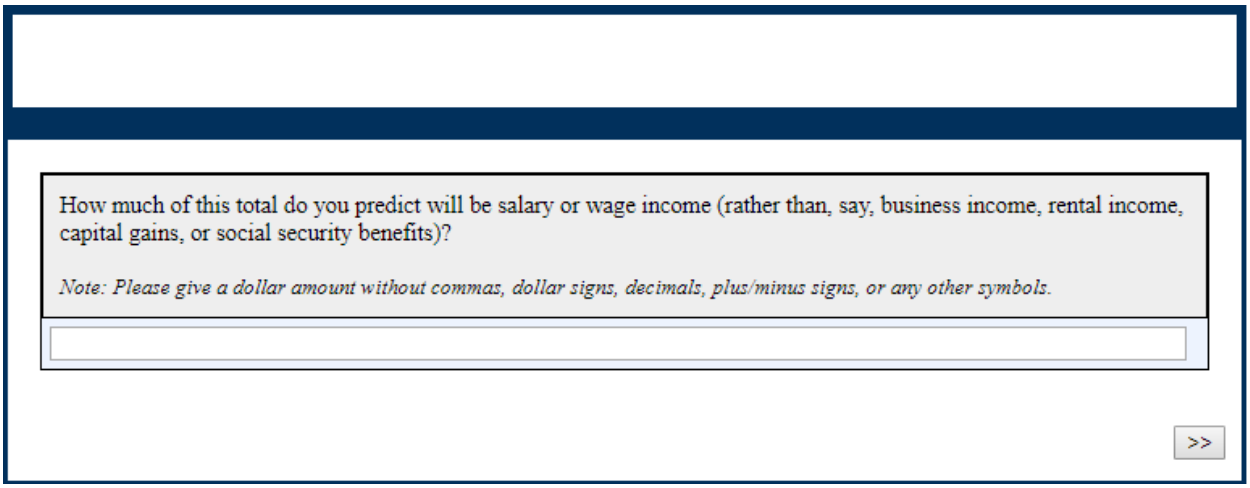
Your predicted total income for 2017 : $1000

In the chart below, please predict your total income for 2017.

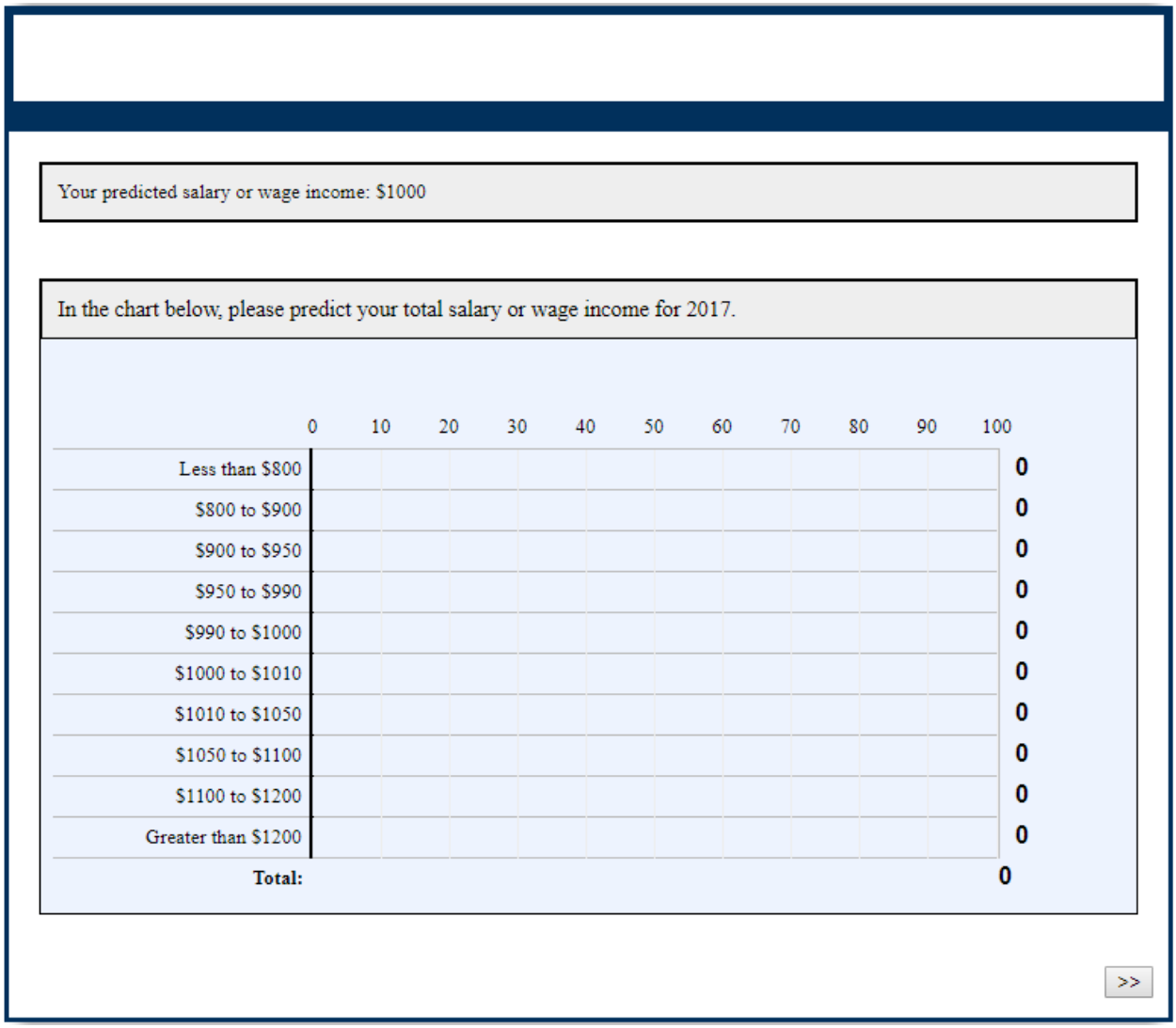


>>

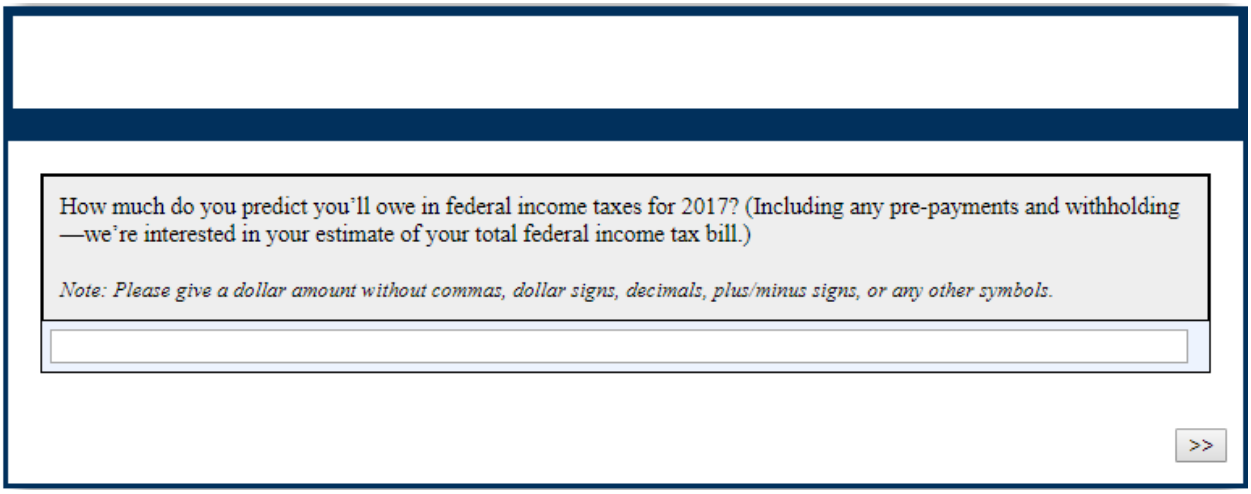
Salary and Wage Income—page 1



Salary and Wage Income—page 2



Federal Income Tax—page 1



Federal Income Tax—page 2

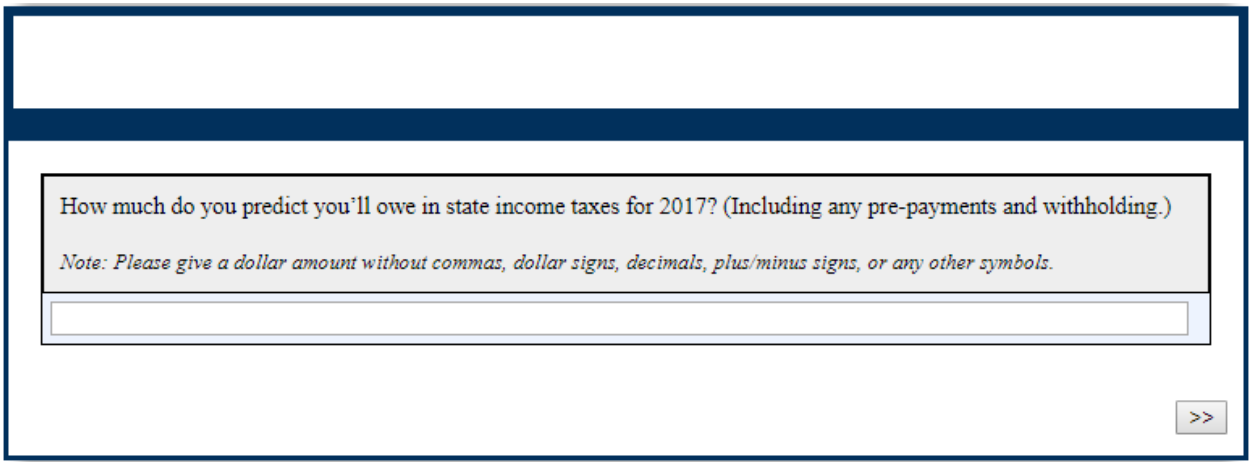
Your predicted federal income taxes for 2017: $1000

In the chart below, please predict your total federal income taxes for 2017. (This amount excludes any deductions or exemptions.)

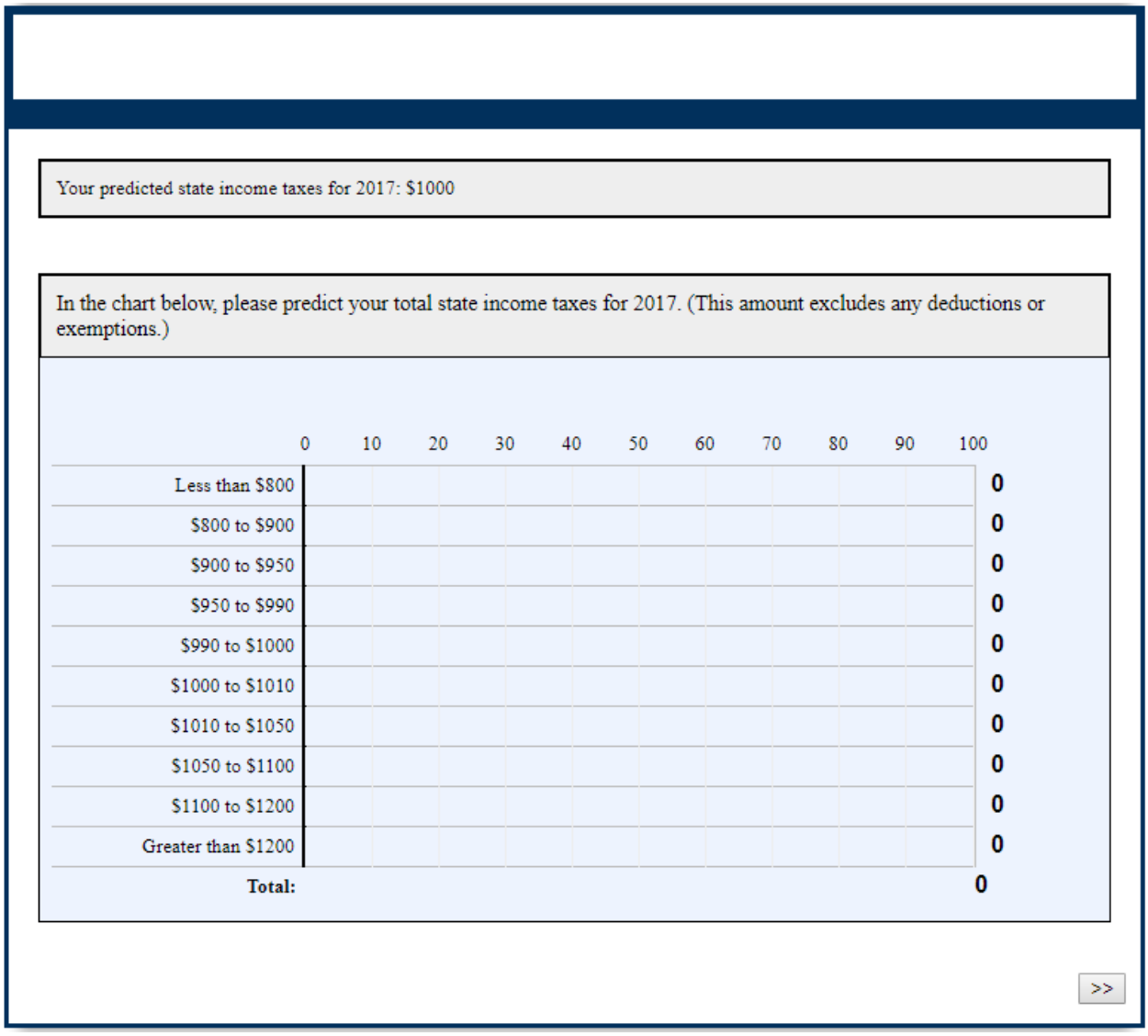
	0 10 20 30 40 50 60 70 80 90 100	
Less than $800		0
$800 to $900		0
$900 to $950		0
$950 to $990		0
$990 to $1000		0
$1000 to $1010		0
$1010 to $1050		0
$1050 to $1100		0
$1100 to $1200		0
Greater than $1200		0
Total:		**0**

>>

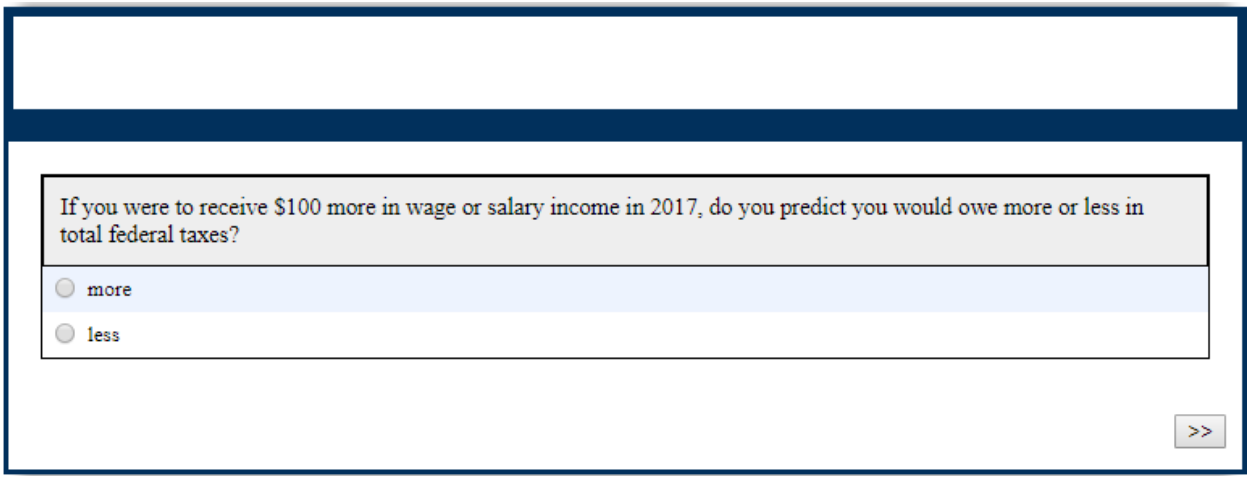
State Income Tax—page 1



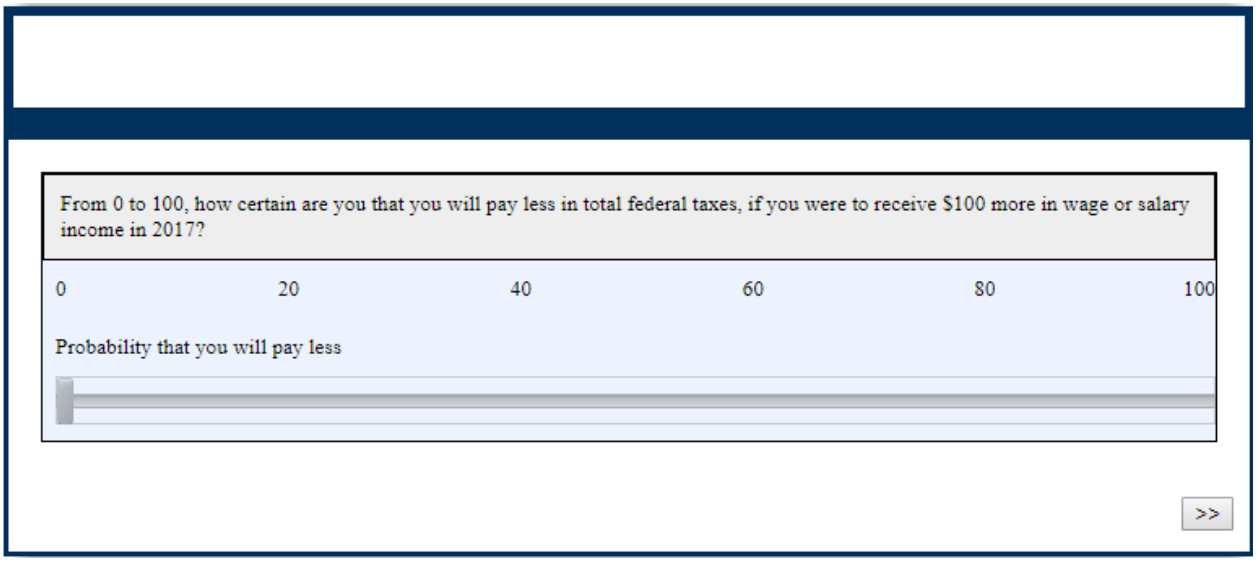
State Income Tax—page 2



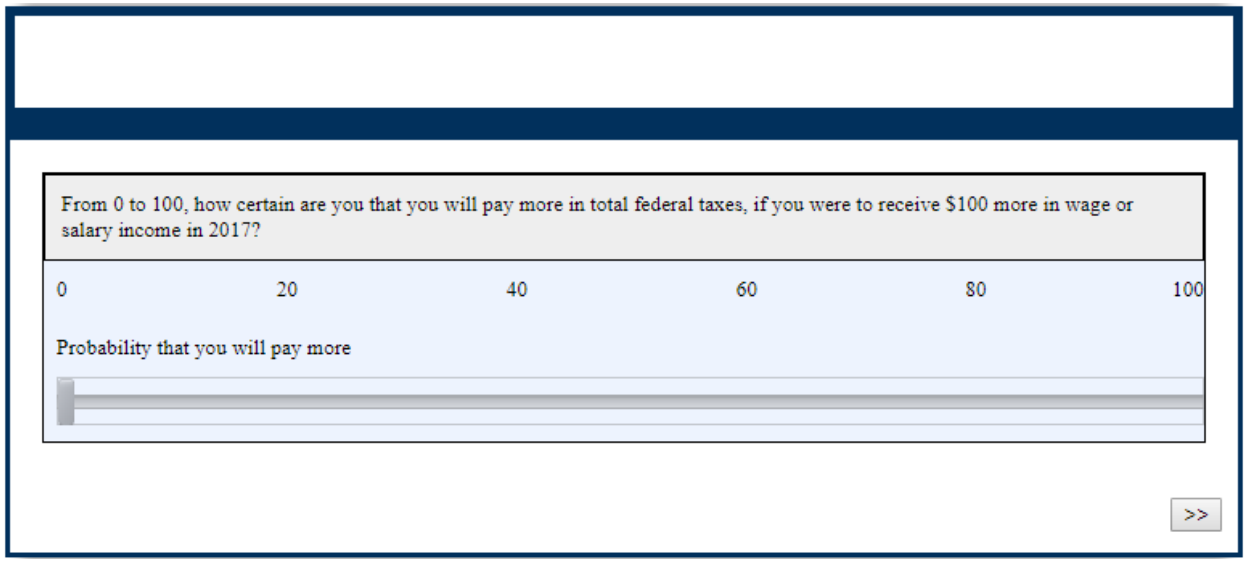
Change in tax from receiving $100—page 1



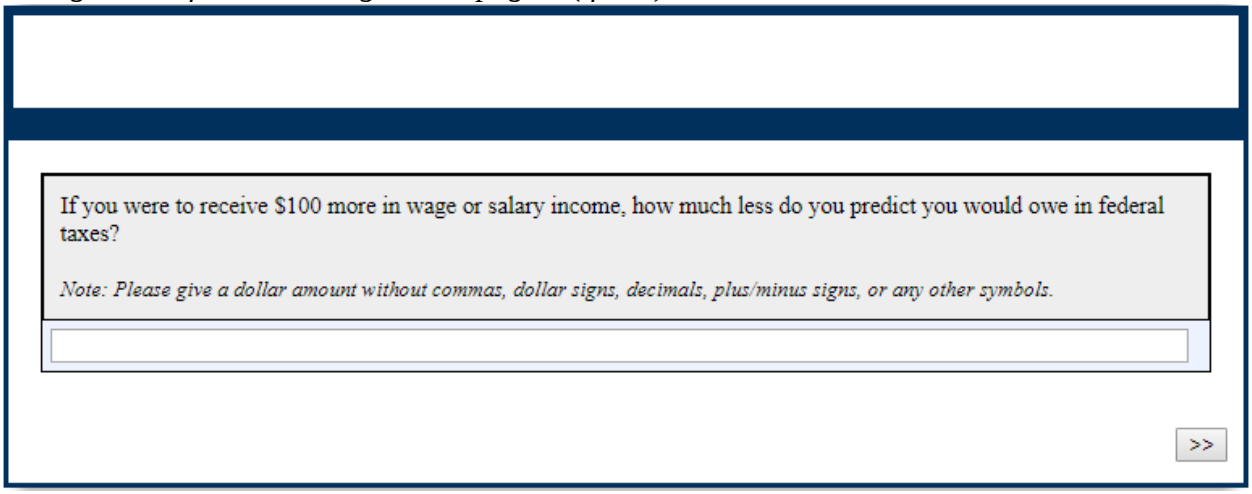
Change in tax from receiving $100—page 2 (if less)



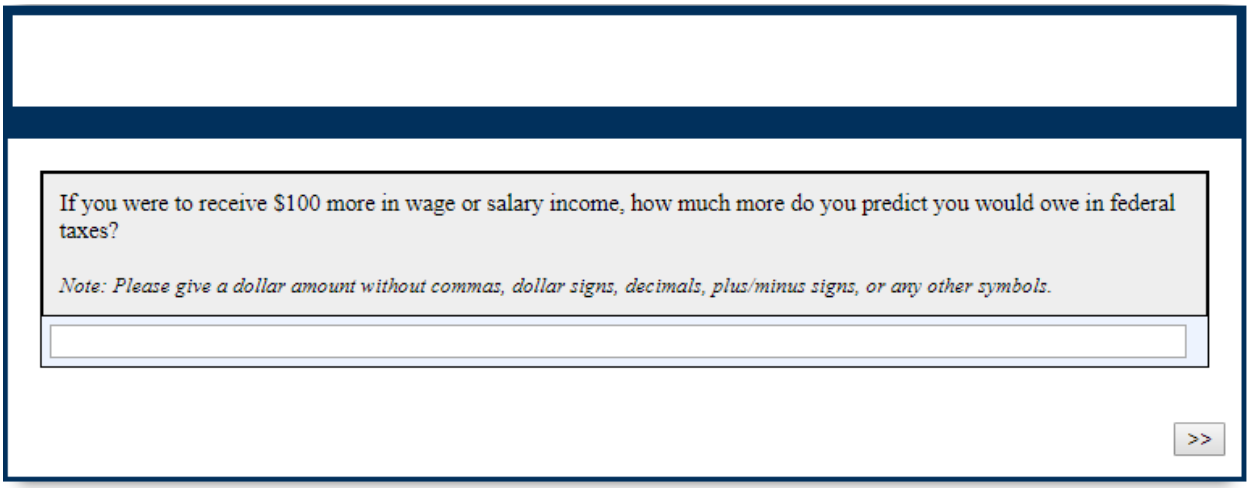
Change in tax from receiving $100—page 2 (if more)



Change in tax from receiving $100—page 3 (if less)



Change in tax from receiving $100—page 3 (if more)



Change in tax from receiving $100—page 4 (if less)

If you were to receive $100 more in wage or salary income, you predicted your federal taxes would be $1000 less

In the chart below, please predict the amount less that you would pay in federal income taxes for 2017.

	0 10 20 30 40 50 60 70 80 90 100	
Less than $800		0
$800 to $900		0
$900 to $950		0
$950 to $990		0
$990 to $1000		0
$1000 to $1010		0
$1010 to $1050		0
$1050 to $1100		0
$1100 to $1200		0
Greater than $1200		0
Total:		0

>>

Change in tax from receiving $100—page 4 (if more)

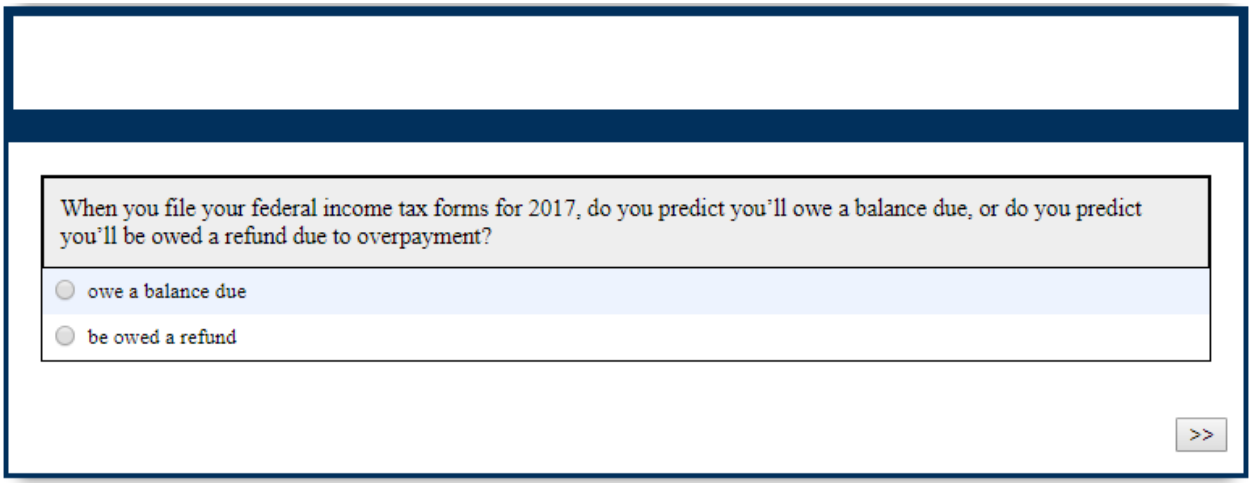
If you were to receive $100 more in wage or salary income, you predicted your federal taxes would be $1000 more

In the chart below, please predict the amount more that you would pay in federal income taxes for 2017.

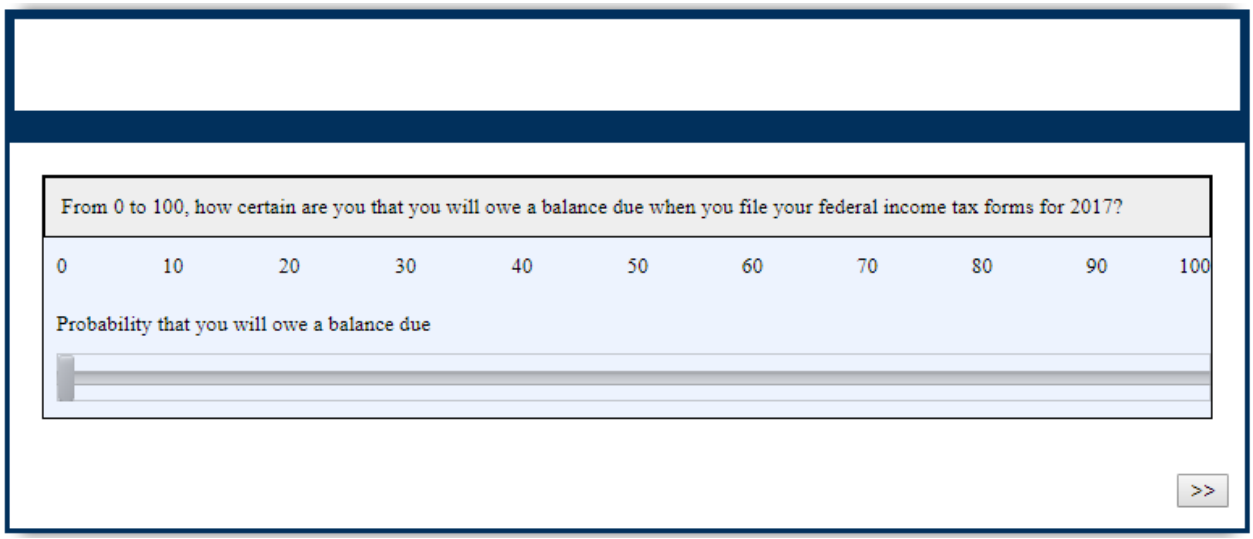
	0 10 20 30 40 50 60 70 80 90 100	
Less than $800		0
$800 to $900		0
$900 to $950		0
$950 to $990		0
$990 to $1000		0
$1000 to $1010		0
$1010 to $1050		0
$1050 to $1100		0
$1100 to $1200		0
Greater than $1200		0
Total:		0

>>

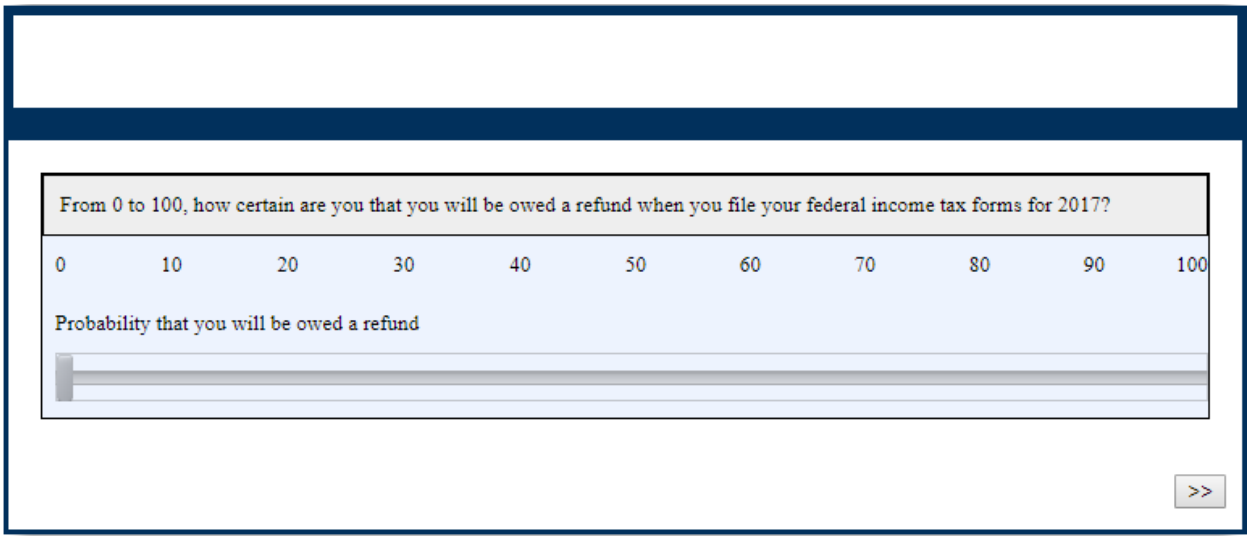
Balance owed or refund due—page 1



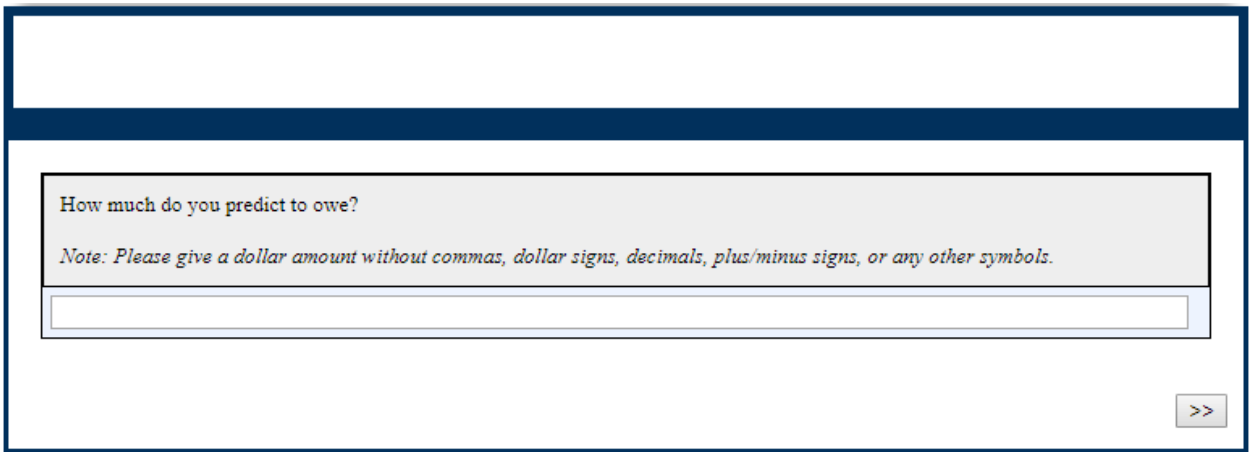
Balance owed or refund due—page 2 (balance)



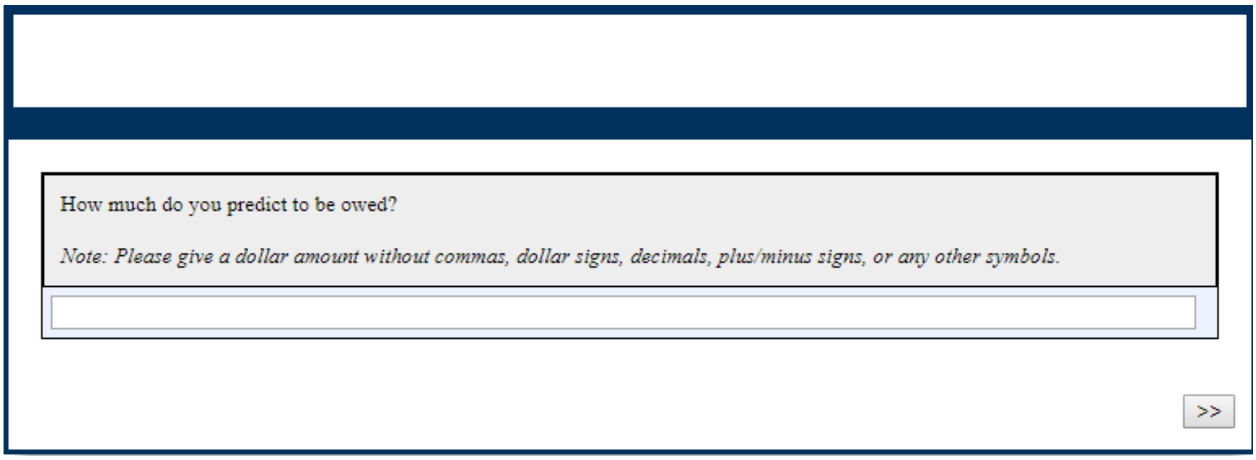
Balance owed or refund due—page 2 (refund)



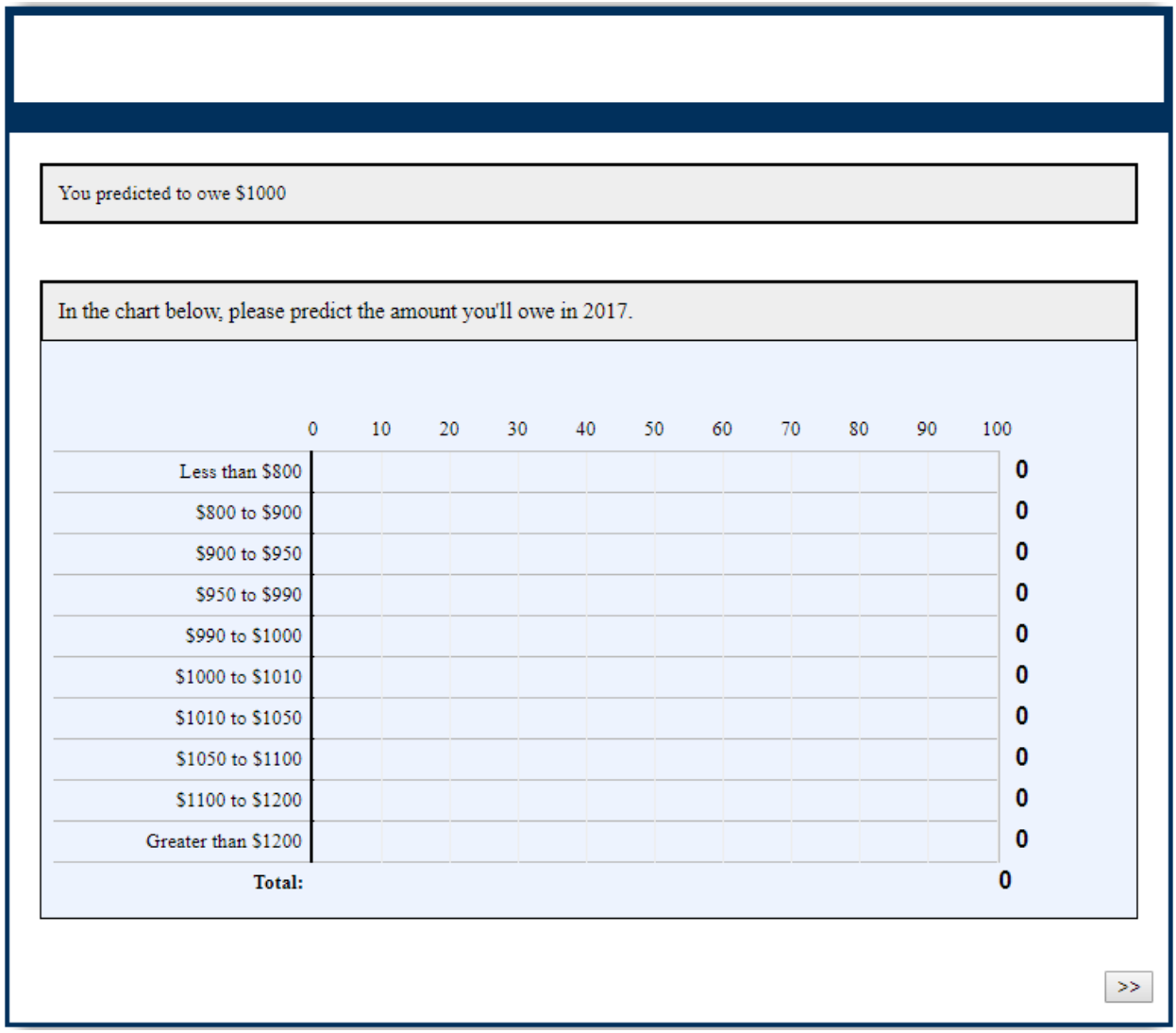
Balance owed or refund due—page 3 (balance)



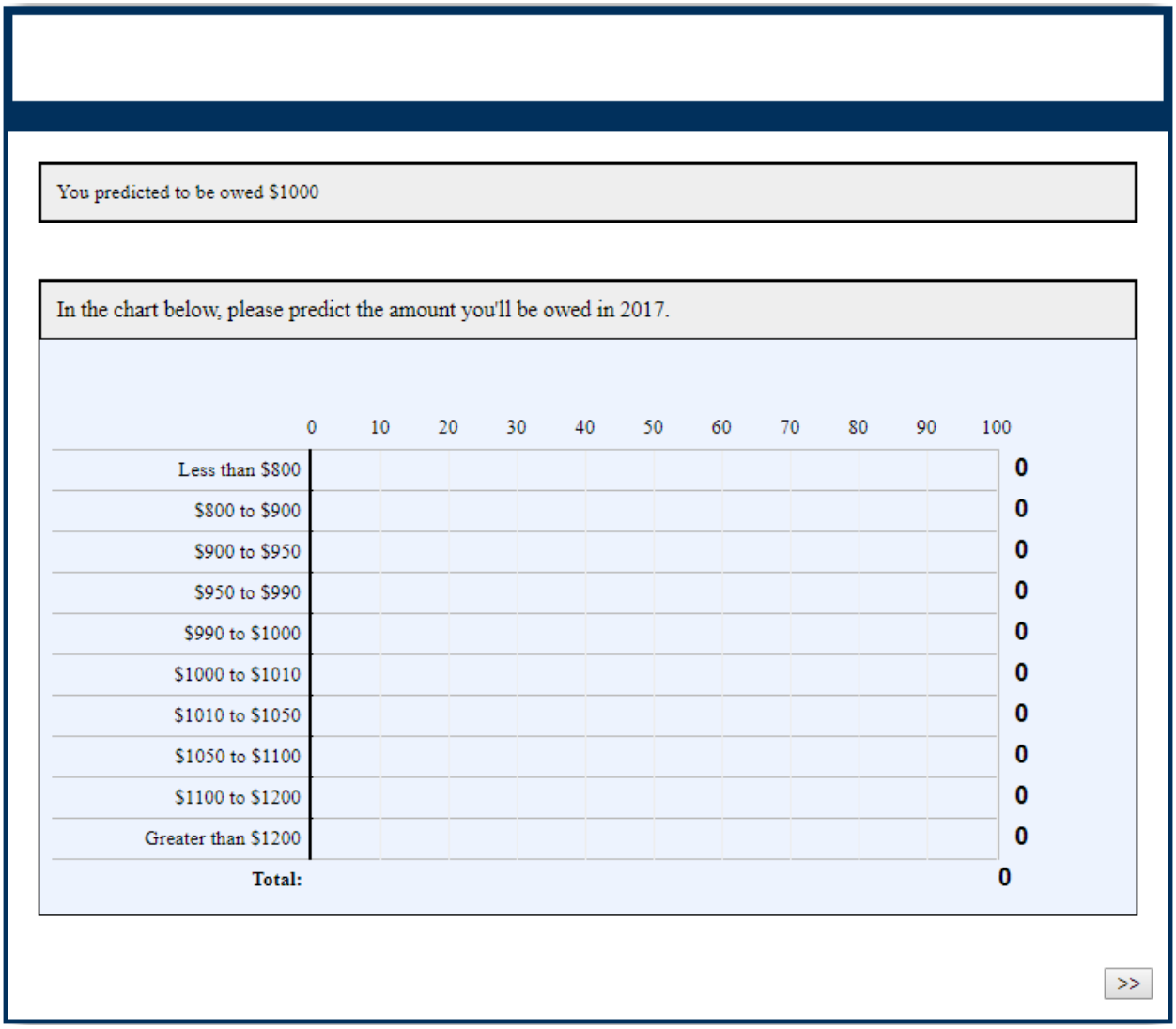
Balance owed or refund due—page 3 (refund)



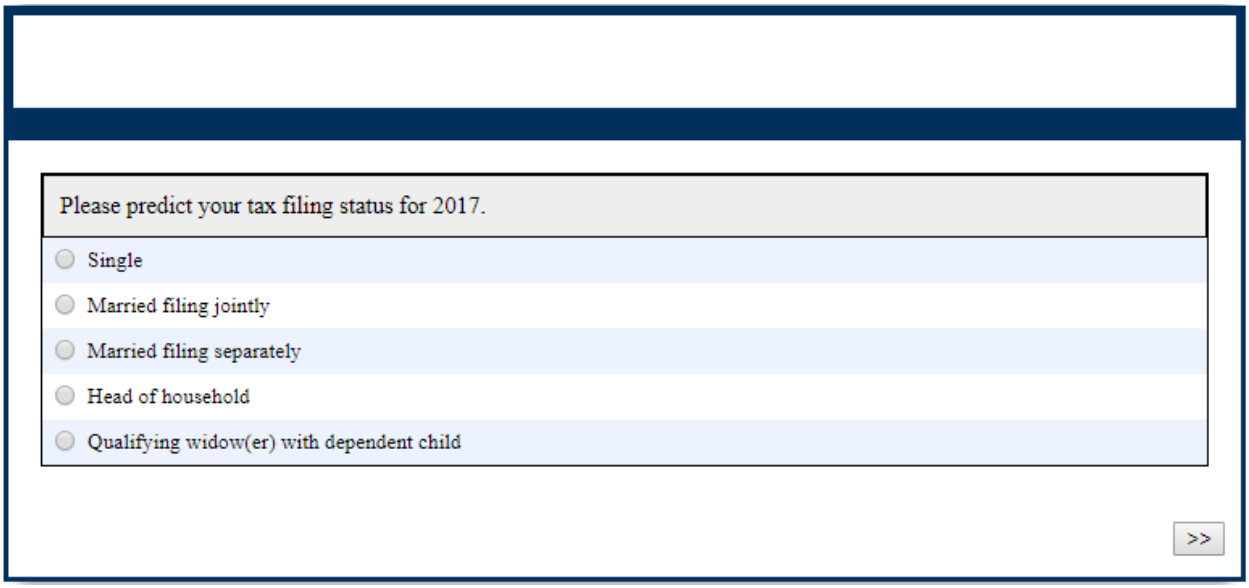
Balance owed or refund due—page 4 (balance)



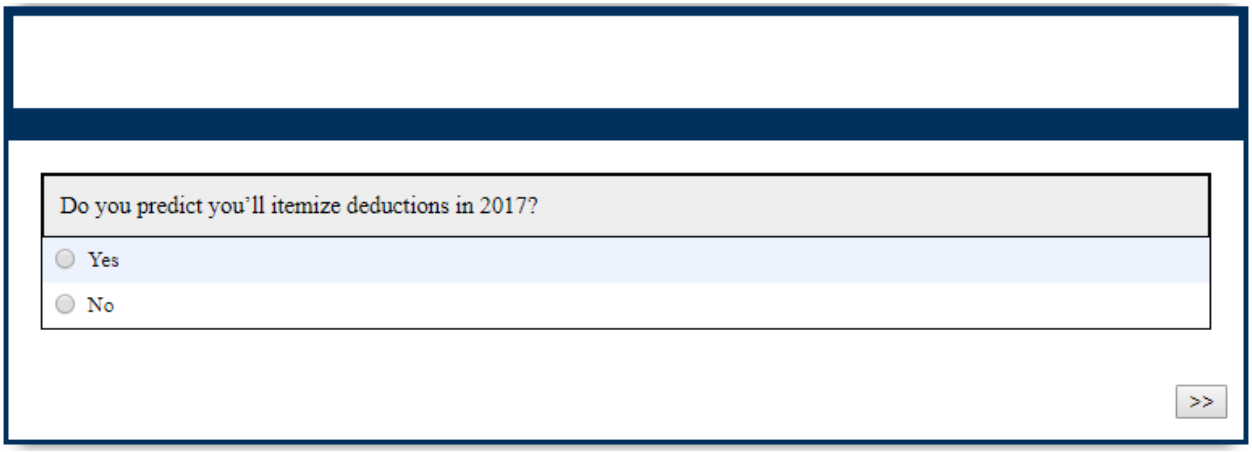
Balance owed or refund due—page 4 (refund)



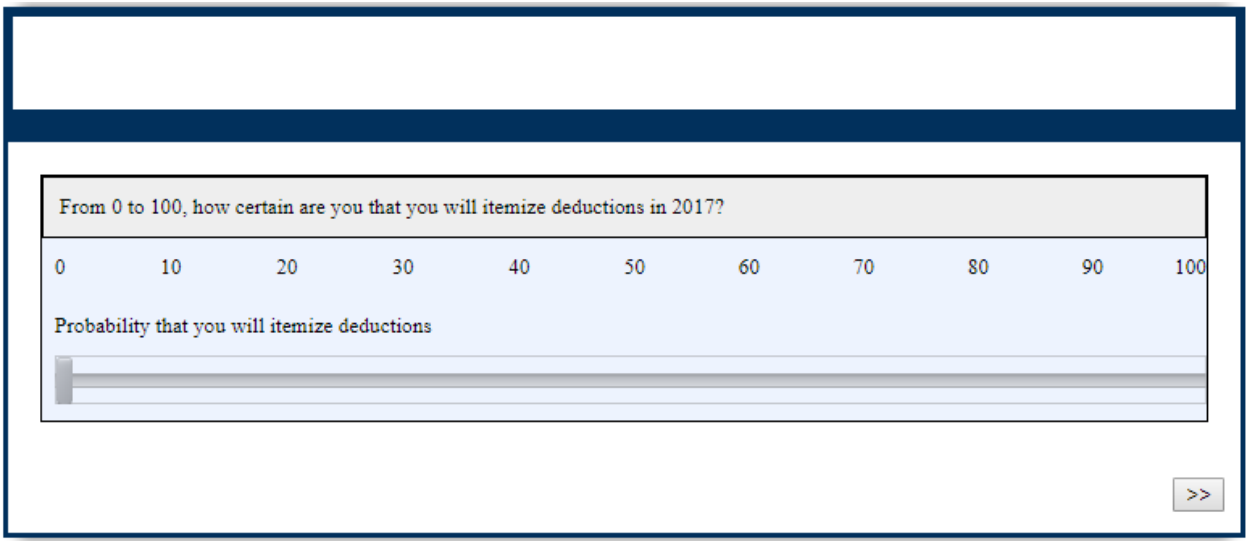
Tax filing status



Itemized Deductions—page 1



Itemized Deductions—page 2 (only if "Yes" on Itemized Deductions—page 1)



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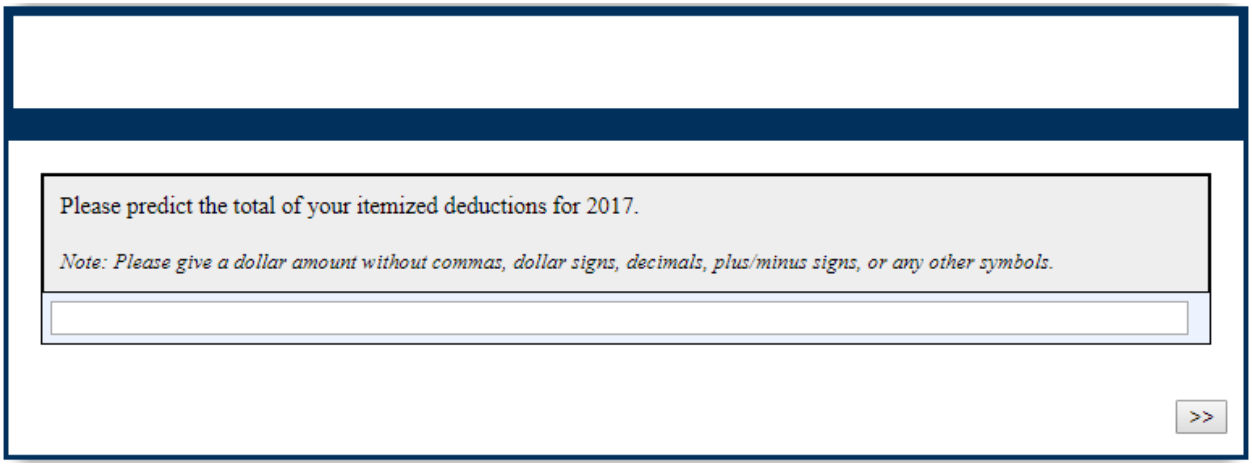
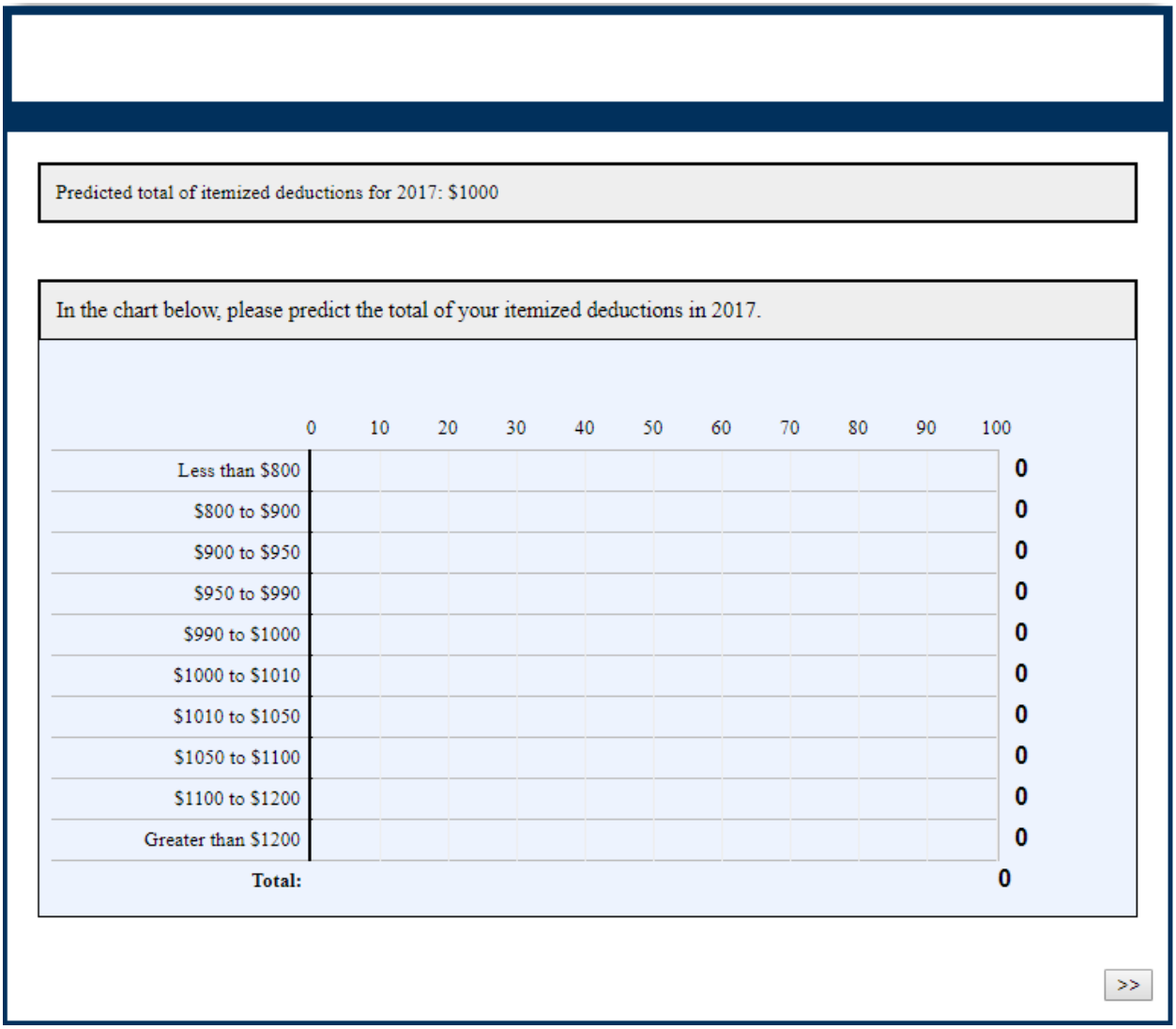
Itemized Deductions—page 3 (only if "Yes" on Itemized Deductions—page 1)



Itemized Deductions—page 4 (only if "Yes" on Itemized Deductions—page 1)



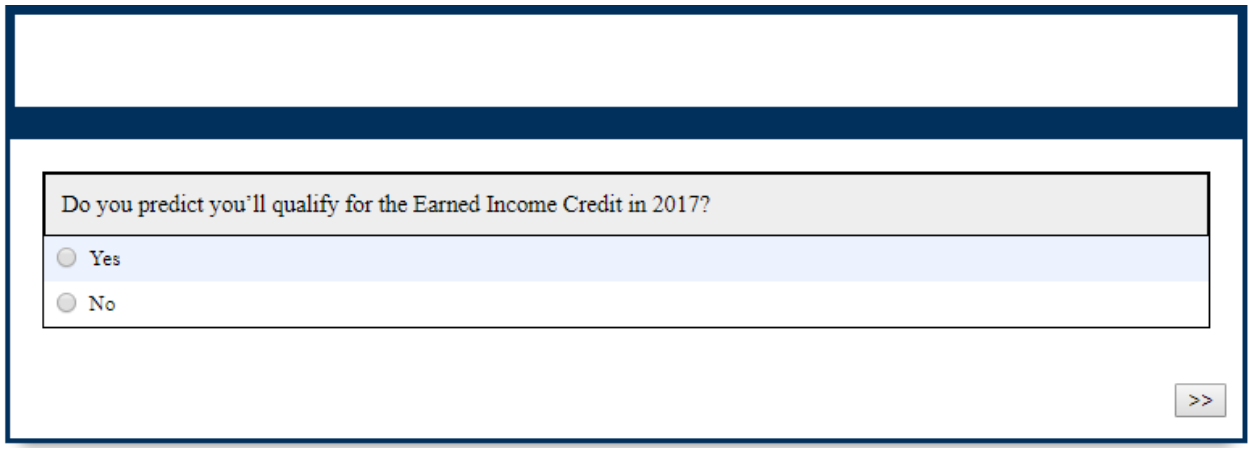
Predicted total of itemized deductions for 2017: $1000

In the chart below, please predict the total of your itemized deductions in 2017.

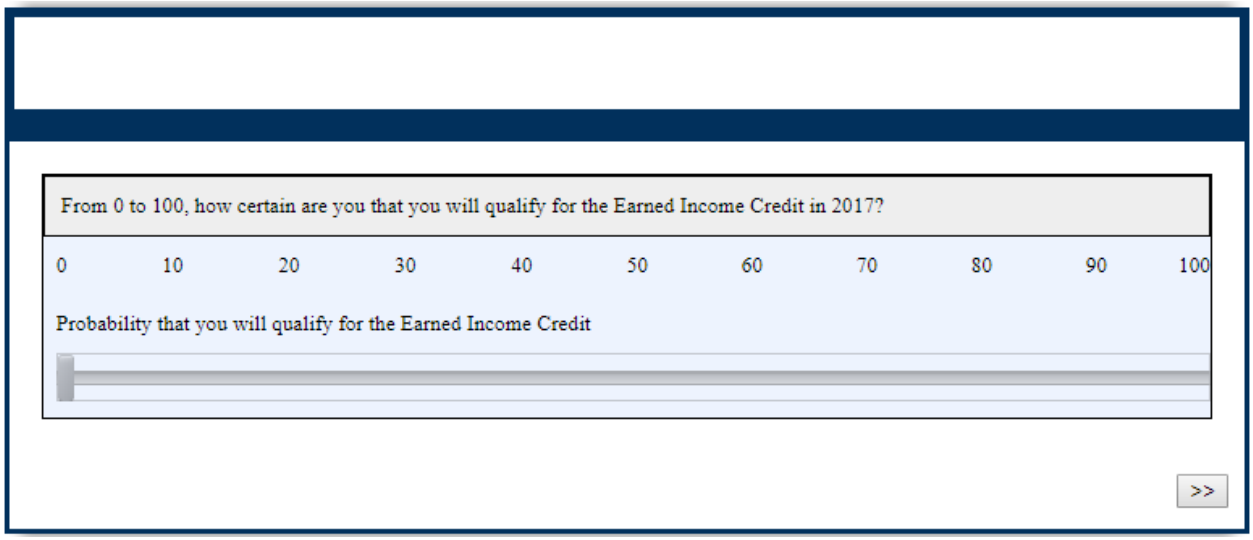
	0 10 20 30 40 50 60 70 80 90 100	
Less than $800		0
$800 to $900		0
$900 to $950		0
$950 to $990		0
$990 to $1000		0
$1000 to $1010		0
$1010 to $1050		0
$1050 to $1100		0
$1100 to $1200		0
Greater than $1200		0
Total:		0

>>

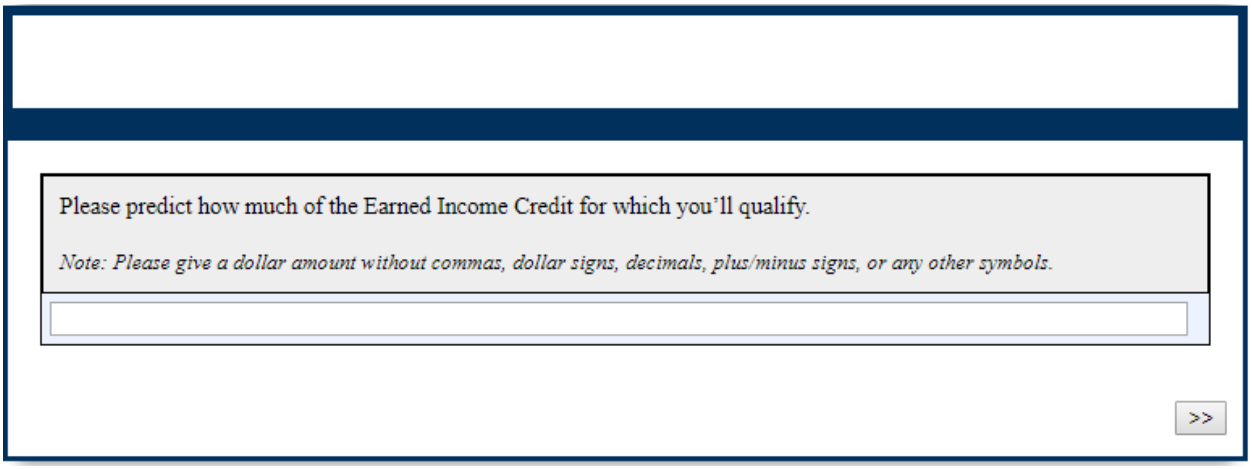
EITC—page 1



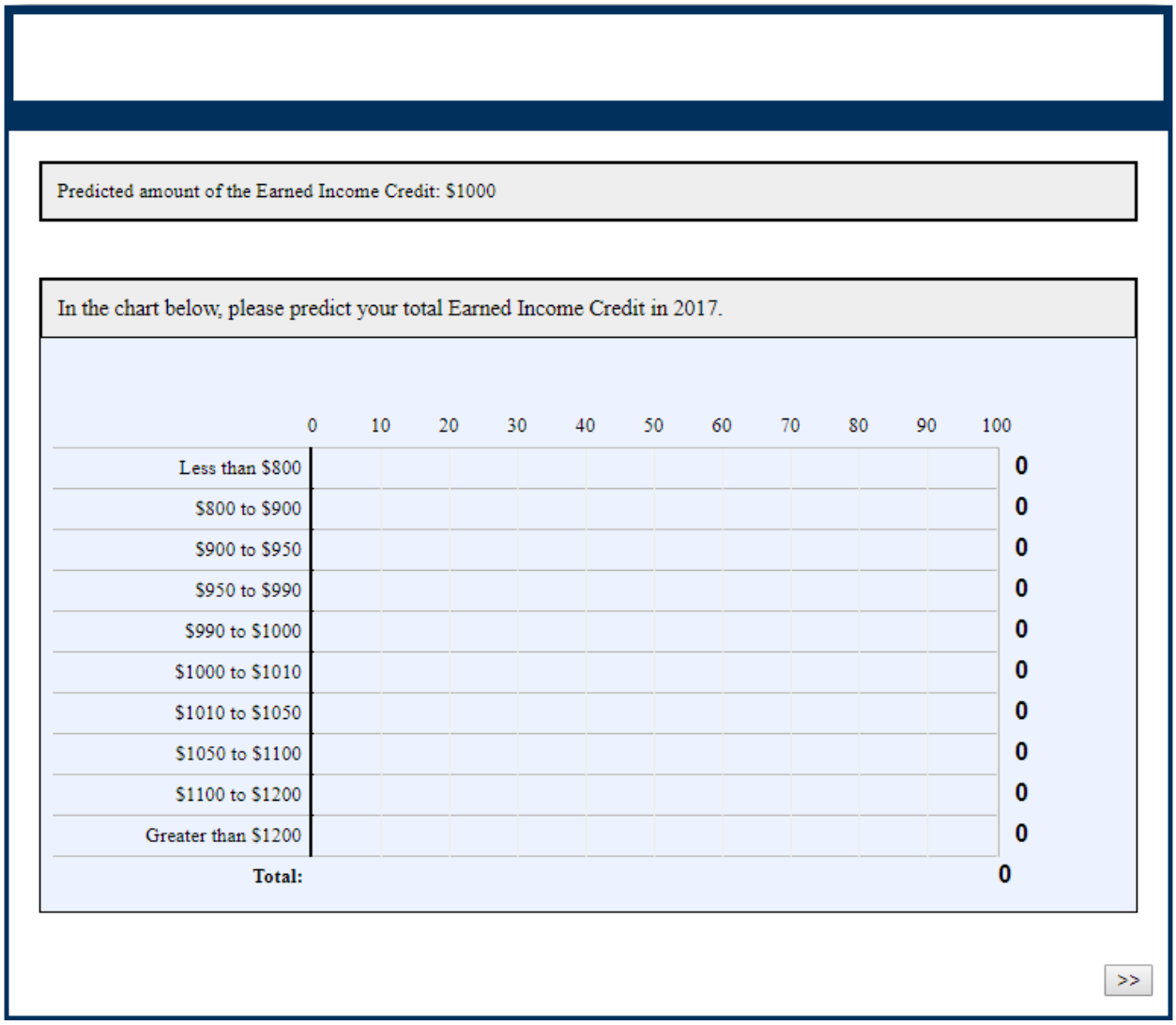
EITC—page 2 (only if "Yes" on EITC—page 1)



EITC—page 3 (only if "Yes" on EITC—page 1)



EITC—page 4 (only if "Yes" on EITC—page 1)



Predicted amount of the Earned Income Credit: $1000

In the chart below, please predict your total Earned Income Credit in 2017.

	0 10 20 30 40 50 60 70 80 90 100	
Less than $800		0
$800 to $900		0
$900 to $950		0
$950 to $990		0
$990 to $1000		0
$1000 to $1010		0
$1010 to $1050		0
$1050 to $1100		0
$1100 to $1200		0
Greater than $1200		0
Total:		**0**

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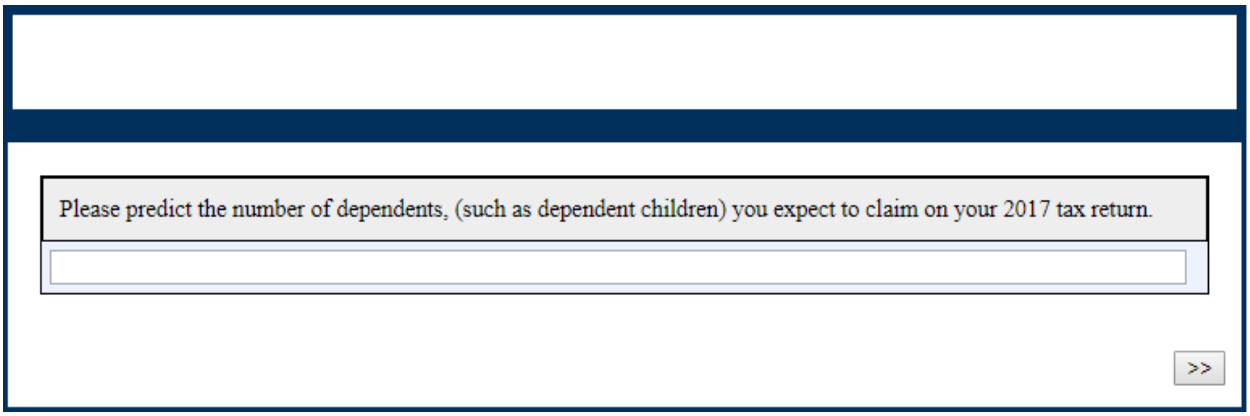
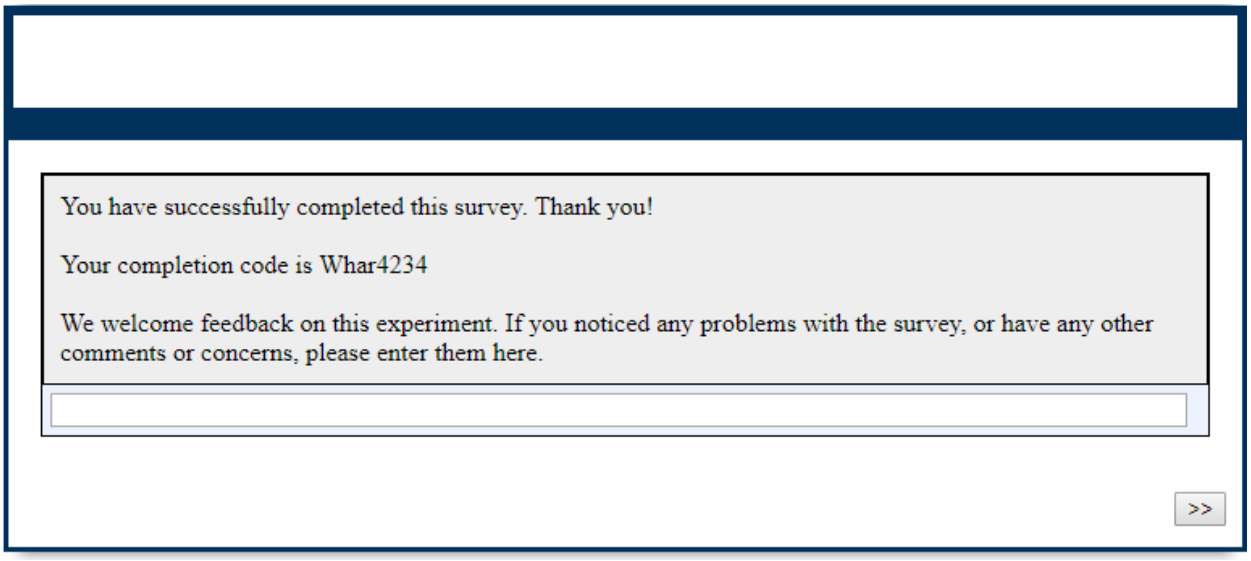
Number of dependents



End of Survey



Failing Comprehension Check or Using Mobile Device