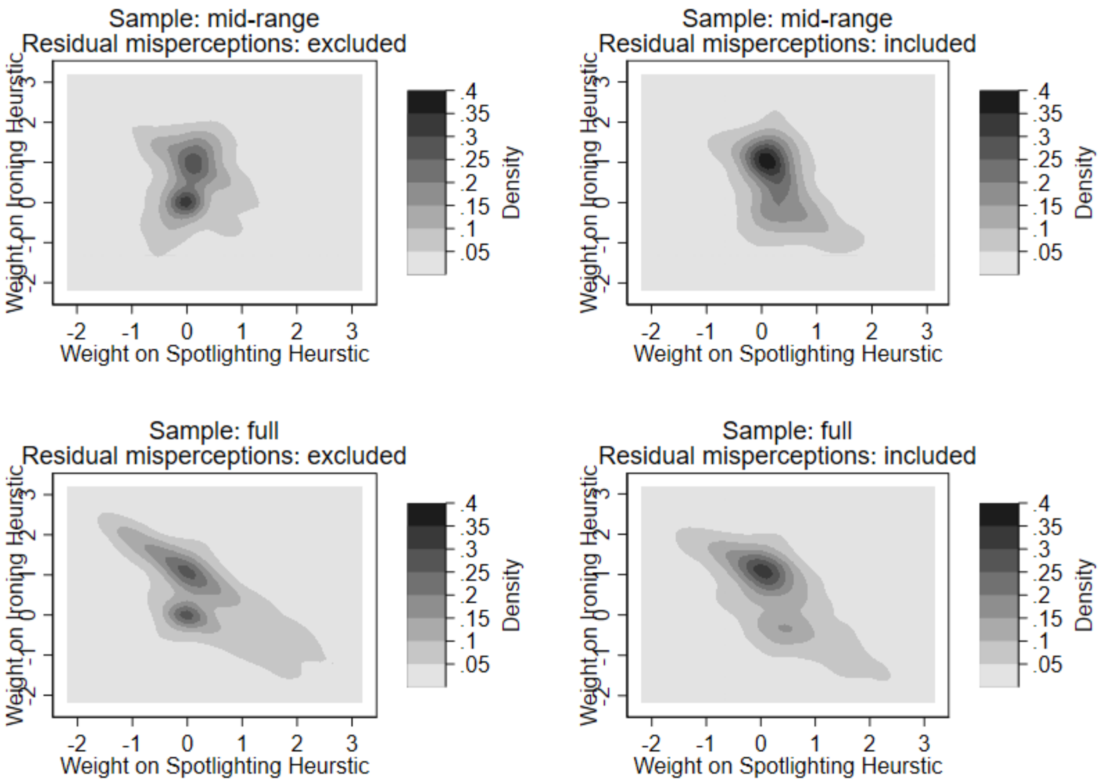
Online Appendix for "Measuring Schmeduling"

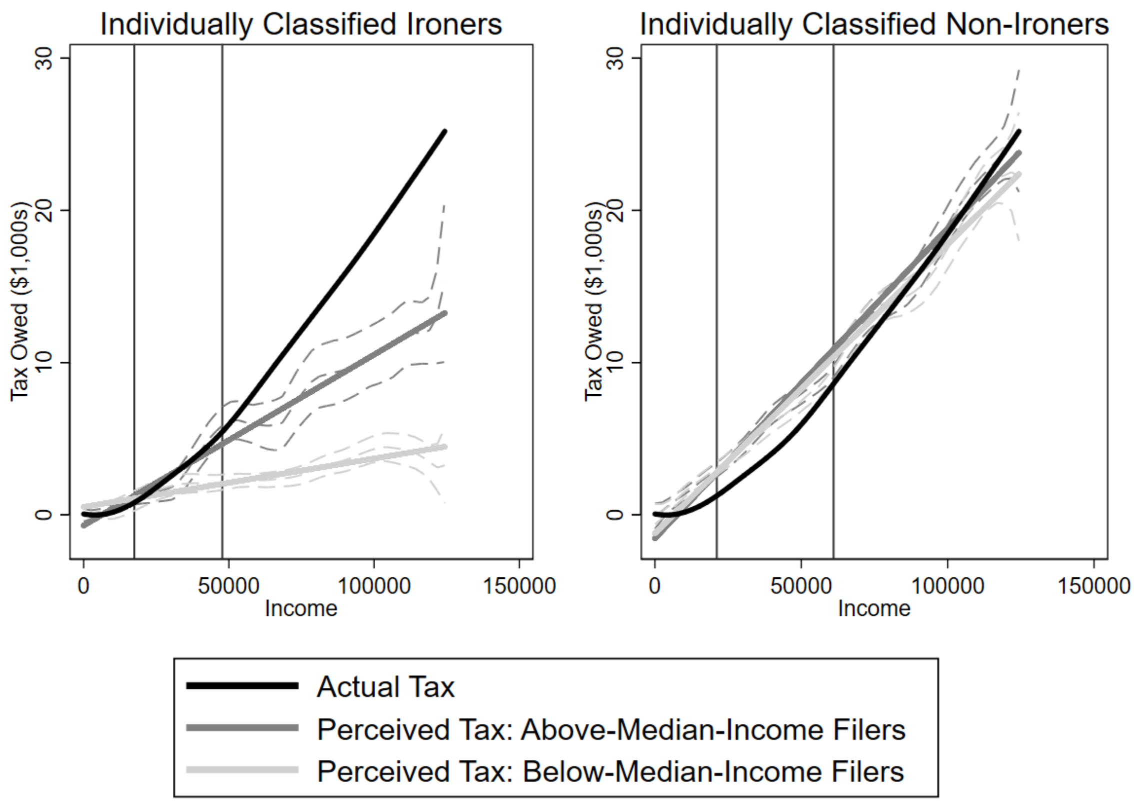
A Supplemental Figure and Tables

Figure A1: Alternative Versions of Figure 5



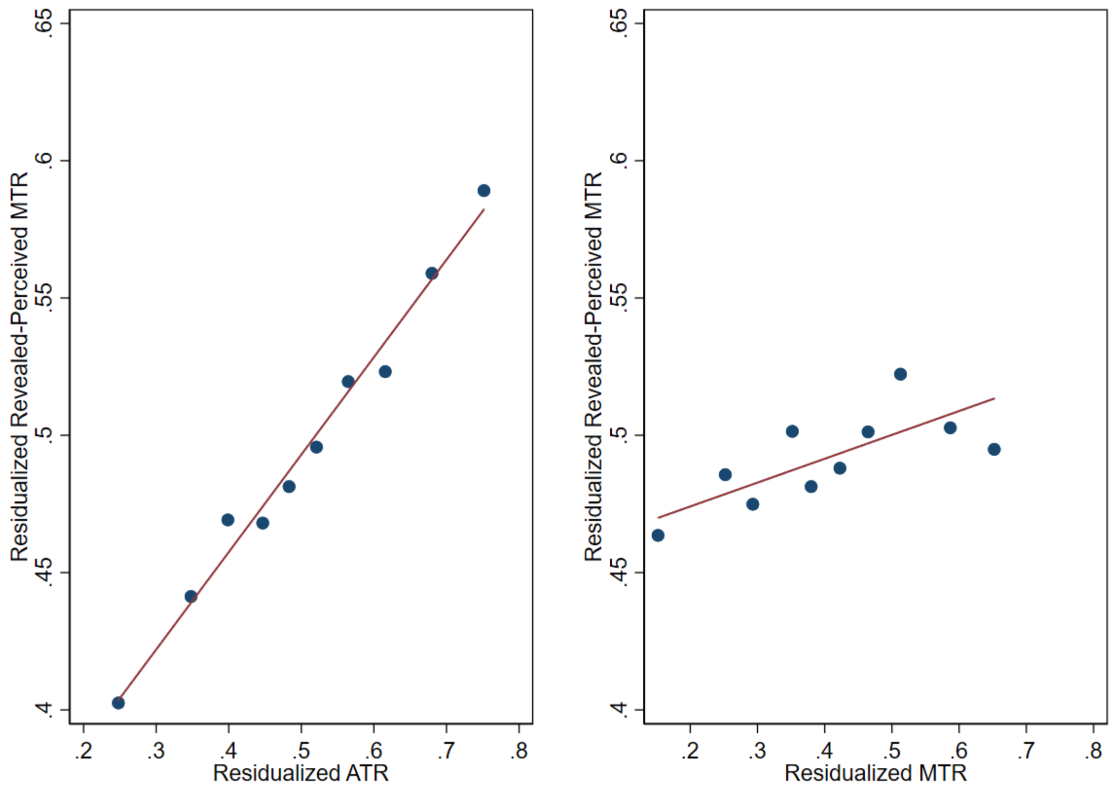
Notes: This figure plots alternative constructions of Figure 5, made to match the restrictions applied in each of the four columns of Table 2. Note that individual-level NLLS regressions failed to converge for 13 respondents when using the mid-range sample, and for 7 respondents when using the full sample.

Figure A2: Examining Perceived Tax Schedules by Individual Classification: Single Filers



Notes: This figure reproduces Figure 6, but uses data from single filers rather than married filing jointly filers. Presented are approximations of the perceived relationship between the income earned and taxes owed, as previously shown in Figure 2, plotted by classification of “ironers” and “non-ironers” from Figure 5. “Ironers” are classified as individuals with an ironing parameter within 0.4 of 1 and spotlighting parameter within 0.4 of 0. For each panel, we separately plot the perceived tax schedule for above and below median filers (conditional on having non-zero tax), with the vertical lines indicating the average income within each group. Dashed lines indicate the local polynomial fits with 95% confidence intervals (Bandwidth: 10,000. Degree of polynomial: 2. Kernel: Epanechnikov), and solid lines indicate fitted linear models.

Figure A3: Conditional Linearity of Revealed-Perceived MTRs



Notes: This figure demonstrates the conditional linearity of revealed perceived MTRs elicited in Study 2, consistent with the predictions of our empirical model. Plotted are "binscatters" of the relationship between revealed-perceived MTR and the true ATR and MTR, respectively. In the left (right) panel, both the x- and y-axis variables are residualized by dummy variables for each discrete ATR (MTR) value. Plotted are the average values evaluated in each decile, and the best fit line.

Table A1: Findings Consistent with "Schmeduling" Predictions in Survey Literature

		Lewis (1978)	*Auld (1979)*	*Fujii & Hawley (1988)*	*Blaufus et al (2015)*
	Predictions:				
1	Taxes on low- vs high-income		I		I
2	Taxes on low- vs high-income, by own income				
3	Perceptions of MTRs	I		I	
4	Slope of tax schedule				
5	Slope of tax schedule, by own income				
	Sample Size	200	1,294	3,197	1,009
	Country	UK	Canada	USA	Germany

Notes: This table summarizes results relevant to predictions 1-5 in the existing tax misperception literature. A result consistent with ironing or spotlighting is indicated with an I or S, respectively.

Table A2: Demographics of Sample Compared to Census Data

	In-sample distribution	Census distribution
Gender		
Male	49%	49%
Female	51%	51%
Age		
18-44	39%	48%
45-64	44%	35%
65+	17%	17%
Income		
Under $15,000	16%	12%
$15,000 to $24,999	12%	10%
$25,000 to $34,999	11%	10%
$35,000 to $49,999	15%	13%
$50,000 to $74,999	19%	17%
$75,000 to $99,999	13%	12%
$100,000 to $149,999	10%	14%
$150,000 to $199,999	3%	6%
$200,000 +	1%	6%

Notes: This table presents tabulations of the gender, age, and income distributions reported in our sample for analysis, compared against the distributions reported in the census. Age distributions condition on being 18+.
Source: http://www.census.gov/prod/cen2010/briefs/c2010br-03.pdf and https://www.census.gov/data/tables/2016/demo/income-poverty/p60-256.html.

Table A3: Table 2 with Modified Definition of Spotlighting

	(1)	(2)	(3)	(4)
γ_I: weight on ironing forecast	0.19***	0.31***	0.46***	0.44***
	(0.054)	(0.066)	(0.052)	(0.101)
γ_S: weight on spotlighting forecast	-0.07	-0.03	-0.03	-0.03
	(0.078)	(0.080)	(0.067)	(0.082)
Residual misperception function included	No	Yes	No	Yes
Income sampling distribution	Mid	Mid	Full	Full
Respondents	4197	4197	4197	4197
Forecasts	41970	41970	58758	58758

Notes: Standard errors, clustered by respondent, in parentheses. Presented are non-linear least squares estimates of ironing and spotlighting propensity, constructed as in Table 2. The sole difference from the analysis in Table 2 is a different coding of the spotlighting forecast. Rather than allowing the heuristic to predict negative tax liability for low incomes, we instead assume that a spotlighter would predict zero tax liability in such circumstances. As these results illustrate, our results are minimally affected by these differences in coding. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Parameter Estimates of Heuristic-Perception Model: Alt. Degrees of Polynomial

	(1)	(2)	(3)	(4)
γ_I: weight on ironing forecast	0.28***	0.41***	0.29***	0.43***
	(0.052)	(0.094)	(0.052)	(0.095)
γ_S: weight on spotlighting forecast	0.01	0.01	-0.00	-0.01
	(0.055)	(0.075)	(0.056)	(0.076)
Degree of $r(t)$ polynomial	1	1	2	2
γ_I: weight on ironing forecast	0.29***	0.43***	0.29***	0.43***
	(0.052)	(0.095)	(0.052)	(0.095)
γ_S: weight on spotlighting forecast	-0.01	-0.02	-0.02	-0.02
	(0.057)	(0.076)	(0.057)	(0.076)
Degree of $r(t)$ polynomial	3	3	4	4
γ_I: weight on ironing forecast	0.29***	0.43***	0.30***	0.43***
	(0.052)	(0.095)	(0.052)	(0.095)
γ_S: weight on spotlighting forecast	-0.02	-0.02	-0.02	-0.02
	(0.057)	(0.076)	(0.057)	(0.076)
Degree of $r(t)$ polynomial	5	5	6	6
γ_I: weight on ironing forecast	0.30***	0.43***	0.30***	0.43***
	(0.052)	(0.095)	(0.052)	(0.095)
γ_S: weight on spotlighting forecast	-0.02	-0.03	-0.02	-0.02
	(0.057)	(0.076)	(0.057)	(0.076)
Degree of $r(t)$ polynomial	7	7	8	8
γ_I: weight on ironing forecast	0.30***	0.43***	0.30***	0.43***
	(0.052)	(0.095)	(0.052)	(0.095)
γ_S: weight on spotlighting forecast	-0.02	-0.03	-0.02	-0.03
	(0.057)	(0.076)	(0.057)	(0.076)
Degree of $r(t)$ polynomial	9	9	10	10
Income Sampling Distribution	Mid	Mid	Full	Full
Respondents	4197	4197	4197	4197
Forecasts	41970	58758	41970	58758

Notes: Standard errors, clustered by respondent, in parentheses. This table reproduces the estimates from columns 2 and 4 of Table 2, while varying the degree of the polynomial used to approximate residual misperception. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Classification of Individuals to Ironing Parameters (Table 2 column 1 analog)

		Weight on Spotlighting Heuristic											
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Total
Weight on Ironing Heuristic	0%	1407	55	35	23	20	22	16	19	17	31	41	1686
	10%	58	10	7	1	2	1	3	4	1	21	0	108
	20%	36	11	2	4	3	3	0	3	12	0	0	74
	30%	39	6	2	1	3	2	3	19	0	0	0	75
	40%	38	12	4	1	1	4	21	0	0	0	0	81
	50%	20	8	4	5	2	28	0	0	0	0	0	67
	60%	27	16	5	7	24	0	0	0	0	0	0	79
	70%	36	13	13	35	0	0	0	0	0	0	0	97
	80%	29	18	59	0	0	0	0	0	0	0	0	106
	90%	34	91	0	0	0	0	0	0	0	0	0	125
	100%	1054	0	0	0	0	0	0	0	0	0	0	1054
	Total	2778	240	131	77	55	60	43	45	30	52	41	3552

Notes: This table presents the distribution of individual-level classifications of heuristic-use parameters for all respondents with positive tax liability. For each respondent, we compared their 10 mid-range sample tax forecasts to the forecast of the model $\tilde{T_{f,i}} = (1 - \gamma_I - \gamma_S)T(z_{f,i}) + \gamma_I \tilde{T}_I(z_{f,i}|z_i^*) + \gamma_S \tilde{T}_S(z_{f,i}|z_i^*) + \epsilon_{f,i}$. We calculated this forecast for the grid of values of (γ_I, γ_S) indicated in the table above, and assigned each respondent to the parameter values which minimized the mean squared error of the difference.

Table A6: Classification of Individuals to Ironing Parameters (Table 2 column 2 analog)

		Weight on Spotlighting Heuristic											
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Total
Weight on Ironing Heuristic	0%	1101	84	72	70	77	56	42	26	14	24	28	1594
	10%	28	13	13	11	4	8	6	8	5	10	0	106
	20%	26	11	5	13	7	6	10	7	12	0	0	97
	30%	30	8	11	4	9	2	6	18	0	0	0	88
	40%	24	19	9	8	7	8	15	0	0	0	0	90
	50%	25	16	13	9	11	29	0	0	0	0	0	103
	60%	34	19	17	10	28	0	0	0	0	0	0	108
	70%	36	24	19	45	0	0	0	0	0	0	0	124
	80%	39	21	68	0	0	0	0	0	0	0	0	128
	90%	49	88	0	0	0	0	0	0	0	0	0	137
	100%	977	0	0	0	0	0	0	0	0	0	0	977
	Total	2369	303	227	170	143	109	79	59	31	34	28	3552

Notes: This table presents the distribution of individual-level classifications of heuristic-use parameters for all respondents with positive tax liability. For each respondent, we compared their 10 mid-range tax forecasts to the forecast of the model $\tilde{T_{f,i}} = (1 - \gamma_I - \gamma_S)(T(z_{f,i}) + \hat{r}(T(z_{f,i}))) + \gamma_I \tilde{T}_I(z_{f,i}|z_i^*) + \gamma_S \tilde{T}_S(z_{f,i}|z_i^*) + \epsilon_{f,i}$, where $\hat{r}$ represents the fitted residual misperception function estimated in column 2 of Table 2. We calculated this forecast for the grid of values of (γ_I, γ_S) indicated in the table above, and assigned each respondent to the parameter values which minimized the mean squared error of the difference.

Table A7: Classification of Individuals to Ironing Parameters (Table 2 column 3 analog)

Weight on Ironing Heuristic	**Weight on Spotlighting Heuristic**											
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Total
0%	1155	77	36	31	42	42	42	34	26	39	60	1584
10%	38	13	8	3	6	3	7	5	13	16	0	112
20%	24	8	4	4	3	4	2	2	22	0	0	73
30%	24	11	7	0	1	4	5	30	0	0	0	82
40%	20	12	5	4	3	1	34	0	0	0	0	79
50%	20	10	3	4	3	38	0	0	0	0	0	78
60%	20	11	9	4	40	0	0	0	0	0	0	84
70%	29	14	6	47	0	0	0	0	0	0	0	96
80%	20	12	64	0	0	0	0	0	0	0	0	96
90%	32	81	0	0	0	0	0	0	0	0	0	113
100%	1155	0	0	0	0	0	0	0	0	0	0	1155
Total	2537	249	142	97	98	92	90	71	61	55	60	3552

Notes: This table presents the distribution of individual-level classifications of heuristic-use parameters for all respondents with positive tax liability. For each respondent, we compared their 14 tax forecasts to the forecast of the model $\tilde{T_{f,i}} = (1-\gamma_I-\gamma_S)T(z_{f,i}) + \gamma_I \tilde{T}_I(z_{f,i}|z_i^*) + \gamma_S \tilde{T}_S(z_{f,i}|z_i^*) + \epsilon_{f,i}$. We calculated this forecast for the grid of values of (γ_I, γ_S) indicated in the table above, and assigned each respondent to the parameter values which minimized the mean squared error of the difference.

Table A8: Classification of Individuals to Ironing Parameters (Table 2 column 4 analog)

		Weight on Spotlighting Heuristic											
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Total
Weight on Ironing Heuristic	0%	1118	97	47	33	49	27	35	20	23	15	25	1489
	10%	29	16	11	3	9	6	5	5	11	10	0	105
	20%	36	17	7	8	3	3	7	4	8	0	0	93
	30%	32	9	6	3	1	2	3	20	0	0	0	76
	40%	37	11	9	1	0	2	23	0	0	0	0	83
	50%	26	12	10	9	7	17	0	0	0	0	0	81
	60%	34	20	17	6	24	0	0	0	0	0	0	101
	70%	39	27	18	25	0	0	0	0	0	0	0	109
	80%	50	30	56	0	0	0	0	0	0	0	0	136
	90%	56	77	0	0	0	0	0	0	0	0	0	133
	100%	1146	0	0	0	0	0	0	0	0	0	0	1146
	Total	2603	316	181	88	93	57	73	49	42	25	25	3552

Notes: This table presents the distribution of individual-level classifications of heuristic-use parameters for all respondents with positive tax liability. For each respondent, we compared their 14 tax forecasts to the forecast of the model $\tilde{T_{f,i}} = (1 - \gamma_I - \gamma_S)(T(z_{f,i}) + \hat{r}(T(z_{f,i}))) + \gamma_I \tilde{T}_I(z_{f,i}|z_i^*) + \gamma_S \tilde{T}_S(z_{f,i}|z_i^*) + \epsilon_{f,i}$, where $\hat{r}$ represents the fitted residual misperception function estimated in column 4 of Table 2. We calculated this forecast for the grid of values of (γ_I, γ_S) indicated in the table above, and assigned each respondent to the parameter values which minimized the mean squared error of the difference.

B Robustness Analyses for Study 1

In this Appendix we present additional results and robustness analyses associated with Study 1.

B.1 Persistence of Heuristic Use Among Subgroups

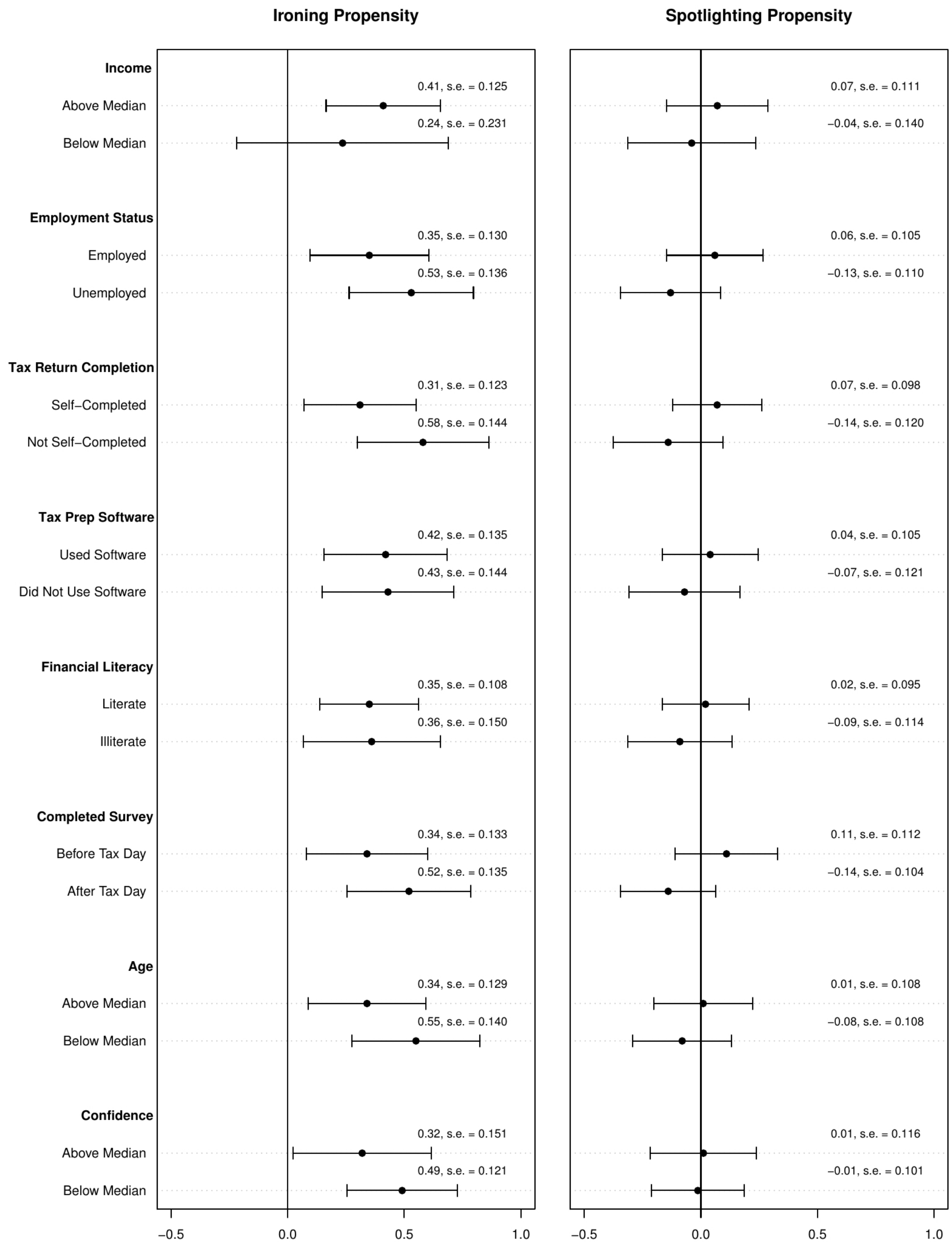
While tax knowledge is important to all people for, e.g., determining which policies and politicians to support or for budgeting spending, economic analyses often hinge on knowledge among specific groups. Groups of particular interest include the rich (in models of redistribution), workers (in models of labor-supply), or individuals completing their own tax returns (in models of compliance). Figure A4 presents estimates of ironing and spotlighting propensity created by applying our primary regression specification to various sample splits of interest. We continue to estimate prevalent ironing among both above- and below-median income respondents (41% vs 24%), the employed and the unemployed (35% vs 53%), those who completed their own tax return and those who did not (31% vs 58%), and those who use tax preparation software and those who do not (42% vs 43%). Furthermore, we find substantial prevalence of the ironing heuristic among both financially literate and financially illiterate tax filers, as classified by whether they do or do not correctly answer all of the "Big Three" financial literacy measures (35% vs 36%). We find that reliance on the ironing heuristic persists among those who completed the survey before or after tax day (34% vs 52%) and among both above- and below-median age respondents (34% vs 55%), suggesting that the misperceptions we document are neither temporarily eliminated by the experience of completing a tax return nor permanently eliminated by the cumulative experience with tax payments incurred over a lifetime. Finally, reliance on ironing persists among those with above- and below-median rates of indicating confidence in their given forecast (32% vs 49%).[1]

Across these sample splits, the propensity to iron is statistically significantly different from zero at least at the 5% α-level in all but one case.[2] The propensity to spotlight is statistically insignificant, evaluated at the 10% α-level, across all sample splits.

[1] Confidence in forecasts was elicited with the question "How confident are you that your answer is within $500 of the correct answer?" Available responses were "not confident at all," "somewhat confident," and "very confident." We conducted our median split by counting the number of forecasts for which the respondent indicated they were very confident. Note that the median respondent was very confident in zero of their forecasts. 40% of respondents were very confident in at least one forecast, and 5% were very confident in all 16 forecasts.

[2] The ironing propensity estimate of 0.24 among below-median income respondents has a clustered standard error of 0.231, generating an extremely large confidence interval that includes zero. This unusually large standard error is generated in this analysis due to multicolinearity: since average tax rates and marginal tax rates are nearly identical for low income filers, with their difference increasing in income on a convex tax schedule, the ironing and spotlighting predictions become highly correlated (ρ=0.91) if attention is restricted to low income respondents. The resulting correlation of the ironing and spotlighting forecasts significantly limits the statistical power of our approach.

Figure A4: Estimates of Heuristic Propensity: Robustness Analyses 1



Notes: The figure summarizes the estimated propensity of ironing and spotlighting across a variety of sample restrictions. The estimates presented correspond to our preferred specification (column 4 of Table 2), but are estimated according to the sample definitions described in the left of the figure.

B.2 Inclusion of Other Taxes

In practice, the federal income tax is not the only tax on income; for most respondents, state taxes and FICA taxes also apply. Our experimental exercise specifically asked respondents to make forecasts about their federal income tax. However, a confused respondent could make forecasts that incorporate additional tax components. Since the inclusion of these extra taxes increases both the aggregate MTR and ATR, the presence of confusion of this sort would render our estimates of the degree of underestimation of the steepness of the tax schedule conservative. Thus, this confusion cannot account for our central reduce-form results. Moreover, this confusion could not account for our reduced-form evidence of ironing, since it would not explain why a respondent's estimate of Fred's tax liability is increasing in his own income.

In principle, such confusion could affect point estimates of ironing propensity. To examine the sensitivity of estimates to these concerns, we reestimate our primary heuristic model presented in Table 2 under three alternative assumptions: that the true tax, ATR, and MTR are all based on an aggregate tax schedule that additionally includes FICA tax, state tax, or both.[3]

Results are presented the top panel of Figure A5. We find that our conclusions regarding heuristic propensity are broadly similar across these alternative specifications. Estimated rates of ironing range from 37% to 55% across these specifications, whereas spotlighting is indistinguishable from zero (or marginally significantly negative in one case). The minimal influence of these alternative assumptions demonstrates an advantage of our empirical approach. The apparent misperception of tax amounts that would result from the contraindicated inclusion of additional taxes takes a form that can be approximated by the residual misperception function. Absent the presence of a residual misperception function, this type of confusion could be incorrectly attributed to heuristic forecasting. With a residual misperception function included, this class of forecasting errors is correctly classified as alternative phenomena, resulting in similar schmeduling propensity estimates.

B.3 Similarity of Actual and Hypothetical Tax Filers

Our experiment focused on a hypothetical taxpayer constructed to approximate the respondent. While the hypothetical taxpayer had the same filing status and number of exemptions as the respondent, he was built with intentionally simple taxable behavior: only wage income, and no additional schedules, credits, or deductions. This design element resolves an important difficulty present in other surveys of tax knowledge: uncertainty about the complete details shaping the respondents' own tax liability. While this design eliminates the measurement error inherent from that lack of knowledge, and thus allows us to incentivize experimental forecasts, it has one undesirable feature: respondents with filing behavior more complex than pure wage income are making forecasts regarding a tax schedule that imperfectly approximates their own. Our description of Fred precisely matches the returns submitted by 1,357 (32%) of our respondents, and the remaining 2,840 respondents have some element of their tax return—such as schedule B-F, an itemized deduction, or a claim to the EITC—that renders the approximation imperfect. In Figure A5, we conduct our main analysis restricted to each group of respondents. Both demonstrate substantial ironing (dissimilar filers: 34%; similar filers: 57%), and statistically insignificant spotlighting.

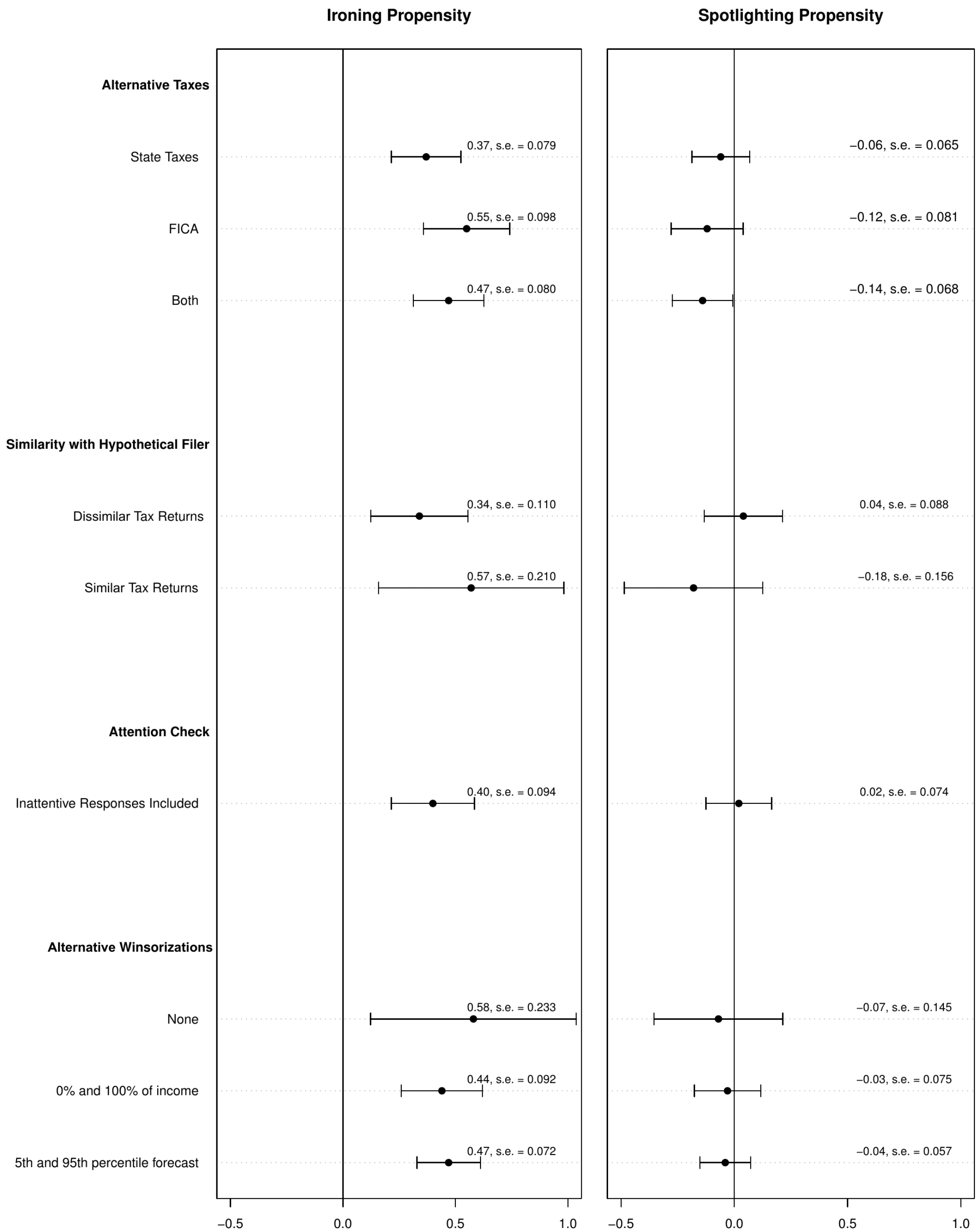
[3] We approximate state tax liability by applying the state's single or married-filing-jointly schedule to the federal adjusted gross income. Note that across states there are often small differences in the calculation of the tax base, which we necessarily abstract from due to data limitations. In analysis including state tax approximations, we exclude 34 respondents that we are unable to match to a state.

B.4 Importance of Data Restrictions

While most of our data restrictions described in section 3.2 are standard and affect few responses, two decisions may be contentious. First, note that we exclude 436 respondents (9% of our initial sample) who failed the attention check included in the miscellaneous questions module. As illustrated in Figure A5, reincluding these respondents has little effect on our estimated heuristic propensities. While this exclusion has little effect on the final results, we implement it as a matter of principle. Prior to running analyses, we worried that forecasts of respondents that do not carefully read instructions would necessarily be imperfect, and that the imperfection resulting from their inattention would not generate an externally valid measurement of the misperceptions of interest.

Second, we employ a Winsorization strategy as a means of controlling extreme forecasts. When deploying a unconstrained-response survey to thousands of respondents, at least a small number of wildly unreasonable forecasts are to be expected. To present an illustrative example, one respondent indicated that the tax due for an income of $823 is $96,321, when in fact it is zero. Even if most respondents have reasonably accurate tax perceptions, a small number of such extreme forecasts can significantly impact both parameter estimates and power. Furthermore, we believe the extremity of such forecasts does not approximate any externally valid forecasting problem, but rather is an indication of unusual confusion or experimental noncompliance. This motivated our choice to Winsorize tax forecasts at the 1st and 99th percentile forecasts within each $10,000 bin. As we demonstrate in Figure A5, alternative means of Winsorization have little impact on our quantitative estimates. Furthermore, our basic results persist even with the complete omission of outlier control, although estimates become notably less precise.

Figure A5: Estimates of Heuristic Propensity: Robustness Analyses 2



Notes: The figure summarizes the estimated propensity of ironing and spotlighting across a variety of sample restrictions. The estimates presented correspond to our preferred specification (column 4 of Table 2), but are estimated according to the sample definitions described in the left of the figure.

C Robustness Analyses for Study 2

In this Appendix we present additional results and robustness analyses associated with Study 2.

C.1 Interval Regression

As discussed in section 4.1, our MPL identifies a narrow range of perceived marginal tax rates that would rationalize a given subject's choices. In our primary regressions, we mapped each interval to its midpoint and applied OLS. Alternatively, one could use techniques such as interval regression, which yield effectively identical results due to the fine partitioning that we adopted. Column 2 of Appendix Table A9 presents point estimates from this approach, yielding extremely similar results.

Table A9: Robustness Checks on Primary Specification in Study 2

	(1) OLS	(2) Intreg	(3) OLS	(4) OLS	(5) OLS
ATR	0.350***	0.350***	0.336***	0.333***	0.308***
	(0.0236)	(0.0237)	(0.0225)	(0.0288)	(0.0274)
MTR	0.0934***	0.0934***	0.0855***	0.0850***	0.0879***
	(0.0238)	(0.0239)	(0.0226)	(0.0288)	(0.0276)
Constant	0.281***	0.281***	0.290***	0.348***	0.362***
	(0.0126)	(0.0126)	(0.0119)	(0.0154)	(0.0146)
Failed Responses Included					
MPL Attention Check			X		X
Final Attention Check				X	X
N	3130	3130	3603	3689	4314

Notes: Standard errors in parentheses. This table reproduces the estimates from column 1 of Table 4. In column 2, estimates are generated by applying interval regression instead of OLS. In columns 3-5, groups of inattentive respondents are re-included in the sample, as indicated by the lower panel. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

C.2 Reinclusion of Excluded Inattentive Respondents

We preregistered exclusion of respondents who failed to satisfy three basic criteria indicating good attention to, and understanding of, our experimental environment. These were: 1) excluding respondents with MPL responses inconsistent with well-behaved, monotone utility, 2) excluding respondents who chose the effectively dominated options at each end of the MPL list, and 3) excluding respondents who failed a simple attention check at the end of the survey. Group 1 cannot be re-included into our analysis in a very principled way, but groups 2 and 3 can be. Columns 3-5 of Appendix Table A9 estimate our primary specification with column 3 re-including group 2, column 4 re-including group 3, and column 5 re-including both groups. Overall, the impact on point estimates is relatively minimal, with both estimates becoming slightly smaller. The attenuation of point estimates is consistent with these respondents being confused and not reacting in any way to the tax schedule in front them.

C.3 Predictive Power of Alternative Models

Table A10: Improvements in Predictive Power from Alternative Models

Interactions in Model				
None	X			
ATR x MTR		X		X
ATR x Complexity			X	X
MTR x Complexity			X	X
ATR x MTR x Complexity				X
Variables in Model				
ATR, MTR	0.0924	0.0954		
ATR, MTR, i.Complexity	0.0934	0.0963	0.0939	0.0980
i.ATR, i.MTR	0.0948	0.0989		
i.ATR, i.MTR, i.Complexity	0.0959	0.0998	0.0993	0.1055

Notes: This table presents the estimated R^2 arising from different versions of the primary analysis of Study 2. We consider models in which the ATR and MTR are included linearly as well as cases with an indicator variable for each discrete value (denoted i.ATR and i.MTR). We additionally vary whether we include an indicator variable for the complexity condition, as well as the presence of interactions between various subsets of included variables.

Table A10 summarizes the changes in the explanatory power of the model resulting from adding different degrees of non-linearity or interactions to the model. Recall from the text that the difference between the simple two-type model and the full schedule-specific-dummy model is not statistically detectable, and as such none of these differences are statistically significant. As this table shows, however, the differences are quantitatively insignificant, with the vast majority of explanatory power being achieved by the our parsimonious baseline.

C.4 Alternative Definition of Simple and Complex Schedules

Table A11: Robustness to exclusion of 0- or 3-kink schedules

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		By Complexity			Re-examined Tax Table		
	Full Sample	Simple	Complex	Diff.	Yes	No	Diff.
ATR	0.35***	0.35***	0.34***	0.01	0.41***	0.29***	0.11**
Coefficients	(0.03)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.05)
MTR	0.11***	0.08**	0.14***	-0.05	0.12***	0.10***	0.02
Coefficients	(0.03)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.05)
Constant	0.28***	0.29***	0.27***	0.03	0.24***	0.32***	-0.08***
	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)
p: LR Test				0.526			0.015
N	2,454	1,239	1,215		1,142	1,312	

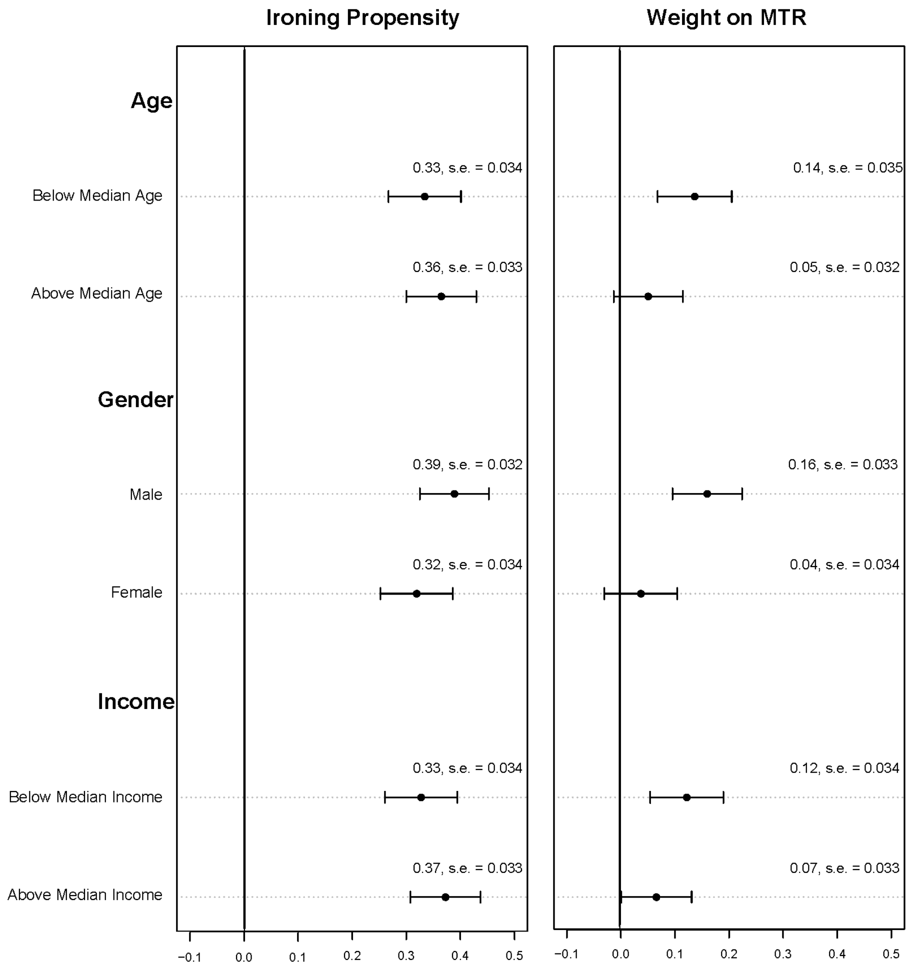
Notes: Standard errors in parentheses. This table reproduces the analysis of Table 4, excluding data associated with schedules where the kink at 40 was "smoothed out." $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

We designed our sampling scheme over schedules to generate exogenous variation in ATR and MTR in a schedule with either 2 or 5 brackets. However, based on the sampling scheme, at times the marginal rate in the bracket immediately above and immediately below the subject's 40 cent income were the same, effectively merging those two brackets. For simple schedules, this results in a linear tax. For complex schedules, this results in a schedule with 3 kinks rather than 4. In Table A11, we recreate our main results restricting the sample to only true 1-kink or 4-kink schedules. This restriction proves to have no meaningful effect on our estimates.

A related feature of our sampling scheme offers an opportunity to study the degree of "effective debiasing" achieved in schedules that equate MTR and ATR. In our data, ATR=MTR for 22% of the schedules. When we regress revealed-percievd MTRs on true MTRs/ATRs among schedules for which the marginal and average tax rates are equal at 40 cents, the point estimate on tax rate on the incremental 20 cents is 0.41 (s.e. = 0.04). This is almost exactly equal to the sum of the coefficients on the ATR and MTR in Table 4, and highlights how far fewer individuals make a mistake when their average and marginal tax rates are equal. This illustrates a value of linear schedules: because they equate MTR and ATR, they guide ironers to behave optimally.

C.5 Differences in Behavior by Demographics

Figure A6: ATR and MTR Reliance by Demographics



Notes: Using data from Study 2, this figure summarizes the estimated propensity of MTR and ATR utilization across a variety of sample restrictions. All regressions correspond to the specification in column 1 of Figure 4 with the sample restricted as indicated.

We explore differences in the estimated coefficients by subjects reported gender, age, and annual income. As illustrated in Appendix Figure A6, we find minimal and insignificant variation across these demographic groups in the propensity to rely on the ironing heuristic. In contrast, we find more meaningful differences in the weight placed on the MTR, with respondents of age greater than or equal to the median age of 35 placing less weight on the MTR (p-value of interaction=0.07) and with female respondents placing less weight on the MTR (p-value of interaction=0.01).

D Theory Appendix

We assume that utility takes the form $G(u(c) - \psi(z/w))$, where u is smooth, increasing and concave, ψ is smooth, strictly increasing and convex, and $\psi'(0) = 0$ and $\lim_{z\to\infty} \psi'(z) = \infty$. We also assume that $-xu''(x)/u'(x) < 1$ to ensure that substitution effects dominate income effects; that is, so that an increase in a flat tax rate decreases the marginal benefits of consumption.

D.1 Existence and Uniqueness of the Solution Concept

Definition 1. Choice $z^*(w)$ is a *Ironing Equilibrium (IE)*, if

$$z^*(w) \in \text{argmax}\{U(z - \tilde{T}(z|z^*(w), \gamma), z/w)\}$$

where $\tilde{T}(z|z^*) = (1-\gamma)T(z^*) + \gamma z A(z^*)$ and $A(z^*)$ is the average tax rate at z^*.

Proposition 1. *Suppose that $T(z)$ is continuous. Then*

1. *There exists a IE $z^*(w)$.*
2. *z^* is continuous and increasing in w.*
3. *z^* is continuous and increasing in γ.*

Proof of Proposition 1 Assume that $G(x) = x$; which is without loss of generality since monotonic transformations of utility functions preserve behaviors.

Part 1. Let $B_{w,\gamma}(z')$ denote an optimal choice of z by an individual facing tax schedule $\tilde{T}(z|z')$. We first establish the following

1. $\tilde{T}(z|z')$ is convex for each z' because $T(z)$ is convex. Because u is concave and ψ is strictly convex, this means that $u(z - \tilde{T}(z|z')) - \psi(z/w)$ is strictly concave in z. Thus $B_w(z')$ is uniquely defined.
2. $B_{w,\gamma}(z')$ is continuous in z' because $u(z - \tilde{T}(z|z')) - \psi(z/w)$ is continuous in z' and is strictly concave in z.
3. $B_{w,\gamma}(z')$ is decreasing in z'. To show this, first note that

$$\frac{d}{dz}u(z - \tilde{T}(z|z')) = [1 - (1-\gamma)T'(z) - \gamma A(z')]u'(\cdot)$$

and

$$\begin{aligned}\frac{d}{dz'}\frac{d}{dz}u(z - \tilde{T}(z|z')) &= -\gamma A'(z')u'(\cdot) + [1 - (1-\gamma)T'(z) - \gamma A(z')](-\gamma z A'(z')u''(\cdot)] \\ &< -\gamma A'(z')u'(\cdot) + (-\gamma z A'(z')u''(\cdot)] \\ &= -\gamma A'(z')u'(\cdot)[1 + zu''(\cdot)/u'(\cdot)] \\ &< 0\end{aligned}$$

This implies that the perceived marginal benefits of increasing z are decreasing in z', and thus $B_{w,\gamma}(z')$ must be decreasing in z'.

4. $B_{w,\gamma}(0) > 0$, since the assumption that $\psi'(0) = 0$ guarantees that the optimal choice of z is interior for any perceived tax schedule. Also, $B_{w,\gamma}(z') < z'$ for large enough z' by the assumption that $\lim_{z\to\infty} \psi'(z) = \infty$.

The above four facts show that $B_{w,\gamma}(z')$ is a continuous and decreasing function, that $B_{w,\gamma}(0) > 0$ and that there exists a $\bar{z}$ large enough such that $B_{w,\gamma}(z) \in [0, \bar{z}]$ for every $z \in [0, \bar{z}]$. Brouwer's theorem guarantees that a fixed point exists. It must also be unique: If $B_{w,\gamma}(x) = x$ and $B_{w,\gamma}(x') = x'$ for $x < x'$ then because $B_{w,\gamma}(x)$ is a decreasing function of x, it must follow that $0 < B_{w,\gamma}(x) - B_{w,\gamma}(x') = x - x'$, which is a contradiction.

Part 2. Because $u(z - \tilde{T}(z|z')) - \psi(z/w)$ is continuous in w and is strictly concave in z, it follows that $B_{w,\gamma}(z')$ is continuous in w. Because $B_{w,\gamma}$ is continuous in w and has a unique fixed point, its fixed point must be continuous as well. If this were not the case, there would be a $\delta > 0$ such that for any $\epsilon > 0$, the fixed points z_ϵ of $B_{w+\epsilon,\gamma}$ and z of $B_{w,\gamma}$ would always satisfy $|z_\epsilon - z| > \delta$. Without loss of generality, there exists an sequence $\{z_{\epsilon_i}\}$, $\epsilon_i \to 0$, such that $z_{\epsilon_i} > z + \delta$ for all i. Thus $B_{w+\epsilon_i,\gamma}(z_{\epsilon_i}) < B_{w+\epsilon_i,\gamma}(z)$ for all i, and we reach the contradiction that

$$\begin{aligned} 0 &> \lim_{\epsilon_i \to 0} (B_{w+\epsilon_i,\gamma}(z_{\epsilon_i}) - B_{w+\epsilon_i,\gamma}(z)) \\ &= \lim_{\epsilon_i \to 0} B_{w+\epsilon_i,\gamma}(z_{\epsilon_i}) - B_{w,\gamma}(z) \\ &= \lim_{\epsilon_i \to 0} z_{\epsilon_i} - z \\ &> \delta \end{aligned}$$

Next, we show that for any $z_1 > z_2$ and z', $\big(u(z_1 - \tilde{T}(z_1|z')) - \psi(z_1/w)\big) - \big(u(z_2 - \tilde{T}(z_2|z')) - \psi(z_2/w)\big)$ is strictly increasing in w. To see this, take the derivative with respect to w:

$$\frac{1}{w^2}\psi'(z_1/w) - \frac{1}{w^2}\psi'(z_2/w)$$

The above equation is positive because ψ' is increasing. Thus for $w_1 < w_2$, $B_{w_1,\gamma}(z) < B_{w_2,\gamma}(z)$ for all z. Moreover, the assumption that $\lim_{z\to\infty} \psi'(z) = \infty$ guarantees that there exists a $\bar{z}$ such that $B_{w_i,\gamma}(z) \in [0, \bar{z}]$ for all $z \in [0, \bar{z}]$ and both $i \in \{1, 2\}$. The statement in the proposition is thus a standard comparative static on fixed points (e.g., Theorem 1 of Villas-Boas, 1997).

Part 3. Continuity in γ follows as in part 2. Next, it follows that for $z_1 > z_2$, $\tilde{T}(z_1|z') - \tilde{T}(z_2|z')$ is decreasing in γ. Thus, for any $z_1 > z_2$ and z', $\big(c - \psi(z_1/w) - \tilde{T}(z_1|z')\big) - \big(c - \psi(z_2/w) - \tilde{T}(z_2|z')\big)$ is increasing in γ. The result then follows as in Part 2 by Villas-Boas (1997). ■

An observation: It is useful to note that convexity of T plays two important roles in the proof of Proposition 1. First, it ensures that the individual's optimization problem is convex, and thus that B_w is single-valued. In particular, this then ensures that B_w has a closed graph, a property that would not hold for all possible T. Second, convexity of T ensures that B_w is a decreasing function. If T were concave, however, B_w would be an increasing function; and more generally, B_w could be increasing in some regions and decreasing in others for some tax schedules T. Existence and uniqueness are thus not guaranteed for all possible T. To ensure existence, the ME concept would need to be extended to allow for "mixed strategies."

D.2 An Instructive Two-Bracket Model

For purposes of crisp and simple exposition, we will illustrate the main qualitative implications of ironing using a model in which individuals are either low-income earners ($w = w_L$) or high-income earners ($w = w_H$). We assume utility takes the form $G(c-\psi(l))$, where ψ is isoelastic with structural elasticity $\varepsilon < 1$. Motivated by our empirical results, we also assume that workers either correctly perceive taxes or are pure ironers ($\gamma = 0$ or $\gamma = 1$), with $Pr(\gamma = 1) \equiv \gamma_I$ for both wage types.

The policymaker sets a two-bracket income tax given by $T(z) = \tau_1 z$ for $z \leq z^\dagger$ and $T(z) = \tau_1 z^\dagger + \tau_2(z - z^\dagger)$ for $z > z^\dagger$. We assume that the parameters are such that low-income earners fall in the bottom bracket while high-income earners fall in the top bracket. For the low-income earners, we assume that $g(w_L, \gamma) > 1$; that is, the policymaker would transfer additional resources to them if he could do it in a non-distortionary way. For the high-income earner, we assume that w_H is high enough that $(\lambda - G'(z - T(z) - \psi(z/w_H)))\, z$ is increasing in z for all $z \in [z^*(w_H, 0), z^*(w_H, 1)]$. This is a slightly stronger version of the assumption that $g(w_H, \gamma) < 1$ for the high income earners, and must be true for high enough w_H. Throughout, we also assume that τ_2 is lower than the revenue-maximizing tax rate.

Preliminaries

We begin with some preliminary observations we use repeatedly in other proofs.

- For high types, the ATR is $A(z) = \frac{\tau_1 z^\dagger + \tau_2(z - z^\dagger)}{z} = \tau_2 - (\tau_2 - \tau_1)z^\dagger/z$.
- Thus $T'(z) - A(z) = (\tau_2 - \tau_1)z^\dagger/z$ and the perceived MTR by ironing H types is $\tilde{\tau}_2^H(z) = (1-\gamma)\tau_2 + \gamma A(z) = \tau_2 - \gamma(\tau_2 - \tau_1)z^\dagger/z$.
- $\frac{\partial A}{\partial \tau_2} = (1 - z^\dagger/z)$ and $\frac{\partial \tilde{\tau}_2}{\partial \tau_2} = 1 - \gamma z^\dagger/z$.
- $\frac{\partial A}{\partial z} = (\tau_2 - \tau_1)z^\dagger/z^2$, and $\frac{\partial \tilde{\tau}_2}{\partial z} = \gamma(\tau_2 - \tau_1)z^\dagger/z^2$.
- The structural elasticity ε is given by $\varepsilon = \frac{1}{(1/w^2)\psi''(z/w)} \cdot \frac{(1/w)\psi'(z/w)}{z} = \frac{\psi'(z/w)}{(z/w)\psi''(z/w)}$.

Lemma 1. *For the high types,* $\frac{dz}{d\gamma} = \frac{\varepsilon z^\dagger(\tau_2 - \tau_1)}{1 - \tau_2 + \gamma(1+\varepsilon)(\tau_2 - \tau_1)(z^\dagger/z)}$.

Proof. The high types' first-order condition for choice of z is

$$(1/w)\psi'(z/w) = 1 - \tilde{\tau}_2^H(z) = 1 - \tau_2 + \gamma(\tau_2 - \tau_1)z^\dagger/z.$$

Differentiating implicitly with respect to γ yields

$$(1/w^2)\psi''(z/w)\frac{dz}{d\gamma} = -\frac{\gamma(\tau_2 - \tau_1)z^\dagger}{z^2}\frac{dz}{d\gamma} + (\tau_2 - \tau_1)(z^\dagger/z)$$

and thus

$$\frac{dz}{d\gamma} = \frac{(\tau_2 - \tau_1)(z^\dagger/z)}{(1/w^2)\psi''(z/w) + \frac{\gamma(\tau_2 - \tau_1)z^\dagger}{z^2}} > 0.$$

This establishes that high-income ironers (those with $\gamma = 1$) choose higher labor supply than high-income non-ironers (those with $\gamma = 0$).

We now have

$$\begin{aligned}\frac{dz}{d\gamma} &= \frac{(\tau_2-\tau_1)(z^\dagger/z)}{(1/w^2)\psi''(z/w)+\frac{\gamma(\tau_2-\tau_1)z^\dagger}{z^2}} \\ &= \frac{(\tau_2-\tau_1)(z^\dagger/z)}{(1/\varepsilon)(1/w)(1/z)\psi'(z/w)+\frac{\gamma(\tau_2-\tau_1)z^\dagger}{z^2}} \\ &= \frac{\varepsilon z^\dagger(\tau_2-\tau_1)}{(1/w)\psi'(z/w)+\varepsilon\gamma(\tau_2-\tau_1)(z^\dagger/z)} \\ &= \frac{\varepsilon z^\dagger(\tau_2-\tau_1)}{1-\tilde{\tau}_2+\varepsilon\gamma(\tau_2-\tau_1)(z^\dagger/z)} \\ &= \frac{\varepsilon z^\dagger(\tau_2-\tau_1)}{1-\tau_2+\gamma(\tau_2-\tau_1)z^\dagger/z+\varepsilon\gamma(\tau_2-\tau_1)(z^\dagger/z)} \\ &= \frac{\varepsilon z^\dagger(\tau_2-\tau_1)}{1-\tau_2+\gamma(1+\varepsilon)(\tau_2-\tau_1)(z^\dagger/z)}\end{aligned}$$

□

Lemma 2. *For the high types,* $\frac{dz}{d\tau_2} = -\frac{z\varepsilon-\gamma z^\dagger\varepsilon}{1-\tau_2+\gamma(1+\varepsilon)(\tau_2-\tau_1)z^\dagger/z} < 0$

Proof. We have

$$\begin{aligned}\frac{dz}{d\tau_2} &= -\frac{1-\gamma z^\dagger/z}{\frac{1}{w^2}\psi''(z/w)+\gamma(\tau_2-\tau_1)z^\dagger/z^2} \\ &= -\frac{1-\gamma z^\dagger/z}{\frac{1-\tilde{\tau}_2}{z\varepsilon}+\gamma(\tau_2-\tau_1)z^\dagger/z^2} \\ &= -\frac{z\varepsilon-\gamma z^\dagger\varepsilon}{1-\tilde{\tau}_2+\gamma\varepsilon(\tau_2-\tau_1)z^\dagger/z} \\ &= -\frac{z\varepsilon-\gamma z^\dagger\varepsilon}{1-\tau_2+\gamma(\tau_2-\tau_1)z^\dagger/z+\gamma\varepsilon(\tau_2-\tau_1)z^\dagger/z} \\ &= -\frac{z\varepsilon-\gamma z^\dagger\varepsilon}{1-\tau_2+\gamma(1+\varepsilon)(\tau_2-\tau_1)z^\dagger/z}\end{aligned}$$

This is negative because $\gamma z^\dagger < z$. □

Lemma 3. *For the high types,* $\frac{d\tilde{\tau}_2}{d\tau_2} > 0$

Proof. Start with the FOC $1-\tilde{\tau}_2 = \psi'(z/w)/w$. Now by Lemma 2, z is decreasing in τ_2, and thus the right-hand-side of the FOC is decreasing in τ_2 (by convexity of ψ). Since the right-hand-side is decreasing in τ_2 , $\tilde{\tau}_2$ must be increasing in τ_2. □

Main results:

Claim 1. Labor supply and thus government revenue increase in the propensity to iron.

Proof. Follows by Lemma 1. □

Claim 2. The extra revenue raised due to ironing is raised progressively.

Proof. Notice that in the two-bracket model, the term $T'(z) - A(z)$ is zero for the low-earning types and is positive for high-earning types, indicating that the entire burden of misoptimization falls on the comparatively rich. Combined with the earlier implication that ironing increases government revenue, this additional result establishes that the additional revenue is raised in a manner that is desirable for redistributive purposes. □

Claim 3. Ironing increases social welfare.

Proof. The first two observations—that ironing counteracts the distortionary affects of taxation by raising earnings, and that it increases government revenue in a progressive fashion—lead to the implication that ironing leads to progressive revenue collection. To see this simply in our two-bracket model, notice that ironing has no effect on the behavior of the low-income earners, for whom the marginal and the average tax rate both equal τ_1. The social welfare effect of increasing the γ of a high-income earner (normalized by the marginal value of public funds), for whom the difference between marginal and average tax rates is $(\tau_2 - \tau_1)\frac{z^\dagger}{z}$, is

$$\underbrace{T'(z)\frac{dz}{d\gamma}}_{\text{Gov revenue}} + \underbrace{\frac{d}{dz}G(z - T(z) - \psi(z/w))\frac{dz}{d\gamma}/\lambda}_{\text{Individual utility cost}} = (T'(z) - g(w_H, \gamma)\gamma(T'(z) - A(z)))\frac{dz}{d\gamma} \tag{1}$$

$$= \left(\tau_2 - g(w_H, \gamma)\gamma(\tau_2 - \tau_1)\frac{z^\dagger}{z}\right)\frac{dz}{d\gamma}$$

Now since $g < 1$ for the high income earners, and since $\gamma(\tau_2 - \tau_1)\frac{z^\dagger}{z} < \tau_2$ for all $z \geq z^\dagger$, it follows that the social welfare impact of increasing the γ of a high income earner is positive. This directly implies that social welfare is increasing in the propensity to iron. □

Claim 4. The revenue and welfare effects of raising tax rates on high incomes are increasing in the propensity to iron.

We prove the result via a series of instructive lemmas that establish intermediate results that further help flesh out the intuition behind how ironers respond to tax rate perturbations. In the first two lemmas we first show that the impact of ironing on earnings is strongest the more convex the the tax schedule is–that is, the higher is τ_2.

Lemma 4. *For the high type, $\frac{d}{d\tau_2}\frac{d}{d\gamma}z > 0$ as long as τ_2 is not so high that raising it further would decrease revenue collected from ironers.*

Proof. That τ_2 is lower than the revenue-maximizing tax-rate for ironers implies that $z + \tau_2\frac{dz}{d\tau_2} \geq 0$, and thus that $\frac{1}{z}\frac{dz}{d\tau_2} \geq -\frac{1}{\tau_2}$. Thus

$$
\begin{aligned}
\frac{d}{d\tau_2}\frac{d}{d\gamma}z &= \frac{d}{d\tau_2}\frac{(\tau_2-\tau_1)}{1-\tilde{\tau}_2+\gamma\varepsilon(\tau_2-\tau_1)(z^\dagger/z)} \\
&\propto (1-\tilde{\tau}_2)+\gamma\varepsilon(\tau_2-\tau_1)(z^\dagger/z) \\
&-(\tau_2-\tau_1)\left[-\frac{d\tilde{\tau}_2}{d\tau_2}-\gamma\varepsilon(\tau_2-\tau_1)(z^\dagger/z^2)\frac{dz}{d\tau_2}+\gamma\varepsilon(z^\dagger/z)\right] \\
&\geq (1-\tilde{\tau}_2)+\gamma\varepsilon(\tau_2-\tau_1)(z^\dagger/z)+(\tau_2-\tau_1)\frac{d\tilde{\tau}_2}{d\tau_2} \\
&-\gamma\varepsilon(\tau_2-\tau_1)^2(z^\dagger/z)(1/\tau_2)-(\tau_2-\tau_1)\gamma\varepsilon(z^\dagger/z) \\
&=(\tau_2-\tau_1)\frac{d\tilde{\tau}_2}{d\tau_2}+(1-\tilde{\tau}_2) \\
&+\gamma\varepsilon(\tau_2-\tau_1)(z^\dagger/z)(1-(\tau_2-\tau_1)/\tau_2)-(\tau_2-\tau_1)\gamma\varepsilon(z^\dagger/z) \\
&=(\tau_2-\tau_1)\frac{d\tilde{\tau}_2}{d\tau_2}+(1-\tilde{\tau}_2)+\gamma\varepsilon\left(\tau_2-\tau_1\right)\left(z^\dagger/z\right)(\tau_1/\tau_2)-(\tau_2-\tau_1)\gamma\varepsilon(z^\dagger/z) \\
&>1-\tau_2+\gamma(\tau_2-\tau_1)(z^\dagger/z)-(\tau_2-\tau_1)\gamma\varepsilon(z^\dagger/z) \\
&>0
\end{aligned}
$$

□

To demonstrate our claim that the impact of ironing on earnings is increasing with τ_2 we now show that as long as τ_2 is below the revenue-maximizing tax-rate, the revenue from ironers will increase in τ_2, a condition of Lemma 4.

Lemma 5. *The tax rate $\bar{\tau}_2^I$ that maximizes revenue from the ironing individuals is higher than the tax rate $\bar{\tau}_2^{NI}$ that maximizes revenue from the non-ironing individuals.*

Proof. Suppose, for the sake of contradiction, that $\bar{\tau}_2^I < \bar{\tau}_2^{NI}$. Then by the previous lemma, $z+\tau_2\frac{dz}{d\tau_2}=0$ for the ironers at $\tau=\bar{\tau}_2^I$, while $z+\tau_2\frac{dz}{d\tau_2}<0$ for the non-ironers at $\tau=\bar{\tau}_2^I$. We will now reach a contradiction if we can show that the revenue extracted from non-ironers is a concave function of τ_2. To that end, note that for the non-ironers, $\frac{dz}{d\tau_2}=-\frac{z\varepsilon}{1-\tau_2}$, and thus

$$
\begin{aligned}
\frac{d}{d\tau_2}\left(z+\tau_2\frac{dz}{d\tau_2}\right) &= 2\frac{dz}{d\tau_2}-\tau_2\frac{d}{d\tau_2}\frac{z\varepsilon}{1-\tau_2} \\
&= 2\frac{dz}{d\tau_2}-\tau_2\frac{\varepsilon(1-\tau_2)\frac{dz}{d\tau_2}+z\varepsilon}{(1-\tau_2)^2} \\
&= 2\frac{dz}{d\tau_2}-\tau_2\frac{-z\varepsilon^2+z\varepsilon}{(1-\tau_2)^2} \\
&= 2\frac{dz}{d\tau_2}-z\varepsilon\tau_2\frac{1-\varepsilon}{(1-\tau_2)^2}<0
\end{aligned}
$$

□

Lemma 6. *Under the assumption that τ_2 is lower than the tax-rate that maximizes revenue, $\frac{d}{d\tau_2}\frac{d}{d\gamma}z>0$ for the high types.*

Proof. Follows directly from the previous two lemmas. ☐

Having characterized the revenue effects of ironing on increasing τ_2, we now proceed to analyze the welfare effects. We begin by characterizing just the effect of increasing τ_2 on an ironer's welfare:

Lemma 7. *An increase in the tax rate impacts a high type ironer's utility by* $-\frac{dz}{d\tau_2}\gamma(\tau_2 - \tau_1)z^\dagger/z$

Proof. We have

$$\begin{aligned}\frac{d}{d\tau_2}(z - T(z) - \psi(z/w)) &= -z + (1 - T'(z) - \psi'(z/w)/w)\frac{dz}{d\tau_2} \\ &= -z + \left(1 - T'(z) - (1 - \tilde{T}'(z))\right)\frac{dz}{d\tau_2} \\ &= -z - \gamma(T'(z) - A(z))\frac{dz}{d\tau_2} \\ &= -z - \gamma(\tau_2 - \tau_1)z^\dagger/z\frac{dz}{d\tau_2}\end{aligned}$$

☐

We now compute the social marginal welfare effect of increasing τ_2, taking into account the revenue effects.

Lemma 8. *The welfare impact of increasing the tax rate on high types with ironing weight* γ *and social marginal welfare weight* g *is given by* $\frac{dW}{d\tau_2} = \frac{dz}{d\tau_2}\left(\tau_2 - g\gamma(\tau_2 - \tau_1)z^\dagger/z\right) + (1-g)z$

Proof. Increasing τ_2 mechanically increases revenue by z. This is offset by the substitution to leisure, which leads to a revenue loss of $-\frac{dz}{d\tau_2}\tau_2$. Putting the revenue effects, which are weighted by λ, together with the impact on individual welfare as computed in Lemma 8, which is weighted by $g(z)$ leads to the statement in the proposition. ☐

We are now ready complete the proof of Claim 4. Lemma 6 implies that a tax rate change impacts ironers less than it does non-ironers. For the welfare effect, note that because $\frac{dz}{d\tau_2}$ is increasing in γ, and because $g\gamma(\tau_2 - \tau_1)z^\dagger/z$ is plainly higher for $\gamma = 1$ than for $\gamma = 0$, the term $\frac{dz}{d\tau_2}\left(\tau_2 - g\gamma(\tau_2 - \tau_1)z^\dagger/z\right)$ is higher for ironers than for non-ironers. Moreover, because z is higher for ironers than non-ironers by Implication 1, our assumptions imply that $(1-g)z$ is higher for ironers than for non-ironers. This completes the proof of Implication 4.

Claim 5. The revenue and welfare effects of raising tax rates on low incomes are decreasing in the propensity to iron.

Proof: Reasoning analogous to Lemma 7 shows that the impact of increasing τ_1 on the utility of high-income full ironers is given by $-\frac{dz}{d\tau_1}\gamma(\tau_2 - \tau_1)z^\dagger/z$. The direct impact on public funds is $z^\dagger$. The indirect substitution effect generates revenue losses given by $-\frac{dz}{d\tau_1}\tau_2$. Putting this together, the social marginal welfare effect stemming from high-income full ironers is given by

$$\begin{aligned}&\frac{dz}{d\tau_1}\left(\tau_2 - g(w_H, 1)(\tau_2 - \tau_1)z^\dagger/z\right) + (1 - g(w_H, 1))z^\dagger \\ &= \frac{dz}{d\tau_1}\left((1 - g(w_H, 1))\tau_2 + g(w_H, 1)A(z)\right) + (1 - g(w_H, 0))z^\dagger\end{aligned}$$

By comparison, the social marginal welfare effect stemming from non-ironers is simply $(1 - g(w_H, 0))z^\dagger$. Because , ironing leads to lower individual utility $g(w_H, 0) > g(w_H, 1)$ and thus $(1 - g(w_H, 1))z^\dagger < (1 - g(w_H, 0))z^\dagger$. Moreover, $\frac{dz}{d\tau_1} < 0$ for ironers. Thus the social marginal welfare effect from increasing τ_1 is decreasing in the number of (full) ironers.

Claim 6. Ironing increases the welfare consequences of making taxes more progressive.

Proof. This is a direct corollary of Implications 5 and 6. □

D.3 Results for a General Income Tax

We now consider perturbations of any smooth income tax $T(z)$ in a model with a continuum of types. We first solve for the effects of increasing the marginal tax rate by some amount $d\tau$ on all incomes above $z(w^\dagger, 0)$—the earnings of non-ironers with wage $w^\dagger$. We then use this to characterize the optimal nonlinear income tax. We assume that the fraction of ironers is γ_I, which is independent of w. We consider a social welfare function $W = \int \alpha(z, w, 1_\gamma)U(c, z/w)dF(w)$, with α denoting the social welfare weights and $U(c, l) = G(c - \psi(l))$. We let λ denote the social marginal value of public funds. We assume that welfare weights α are such that the social marginal welfare weights $g = \alpha U_c/\lambda$ depend only on z. This assumption follows the Saez (2002) treatment of multidimensional heterogeneity.

D.3.1 Preliminary Results

As is standard, we define the structural elasticity to be $\varepsilon(z, w) := \frac{\psi'(z/w)/w}{z\psi''(z/w)/w^2}$. This is the elasticity with respect to a linear tax rate of an individual with wage w earning income z. Note that for a utility function $U(c, l) = c - \frac{l^{1+k}}{1+k}$, the elasticity is $\varepsilon \equiv 1/k$.

We next quantify how non-ironers change their earnings in response to a small decrease η in their marginal tax rate. Their FOC is $\psi'(z/w)/w = (1 - T'(z)) + \eta$. The derivative with respect to η is $\psi''(z/w)/w^2 \frac{dz}{d\eta} = (-T''(z))\frac{dz}{d\eta} + 1$. Thus

$$
\begin{aligned}
\frac{dz}{d\eta} &= \frac{1}{\psi''(z/w)/w^2 + T''(z)} \\
&= \frac{1}{(1 - T')/(z\varepsilon) + T''} \\
&= \frac{z\varepsilon}{1 - T' + z\varepsilon T''}
\end{aligned}
$$

We now analogously compute how ironers respond to a small decrease η in their average tax rate. Consider the ironer's FOC $\psi'(z/w) = w(1 - A(z)) + \eta$. Differentiating that with respect to η yields $\psi''(z/w)/w^2 \frac{dz}{d\eta} = (-A'(z))\frac{dz}{d\eta} + 1$. Now $A = T(z)/z$ and thus $A'(z) = \frac{T'z - T}{z^2} = \frac{T' - A}{z}$. Thus

$$
\begin{aligned}
\frac{dz}{d\eta} &= \frac{1}{\psi''/w^2 + \frac{T' - A}{z}} \\
&= \frac{1}{(1 - A)/(z\varepsilon) + (T' - A)/z} \\
&= \frac{z\varepsilon}{1 - A + \varepsilon(T' - A)}
\end{aligned}
$$

D.3.2 Welfare Gains of Raising Tax Rates

Let $\bar{\gamma}_I(z)$ be the fraction of ironers with incomes above z. Consider increasing the marginal tax rate by some amount $d\tau$ on all incomes above $z^\dagger$. This has the following effects:

1. A mechanical revenue effect, net of welfare loss, given by $d\tau Pr(z \geq z^\dagger)E\left[(z - z^\dagger)(1 - g(z))|z \geq z^\dagger\right]$
2. Substitution toward leisure by the non-ironers. For a given individual, this is $\frac{dz}{d(1-\tau)} = \frac{-z\varepsilon}{1-T'+z\varepsilon T''}$. This leads to an overall loss to public funds given by $d\tau Pr(z \geq z^\dagger | 1_\gamma(z) = 0)E\left[\frac{z\varepsilon T'(z)}{1-T'(z)+z\varepsilon T''(z)}|z \geq z^\dagger, 1_\gamma(z) = 0\right]$.
3. Substitution toward leisures by the ironers. Note that the ironers set $(1-A)-\psi'(z/w)/w = 0$, and thus the impact on a given ironer's welfare from a change dz in earnings is $((1 - T'(z)) - (1 - A(z)))dz = (A(z) - T'(z))dz = (A(z) - T'(z))dz$. The impact on public funds is again $T'(z)dz$. The change dz is $\frac{dz}{d(1-A)} \cdot \left(\frac{z-z^\dagger}{z}\right) d\tau = -\frac{z\varepsilon}{1-A+\varepsilon(T'-A)}\left(\frac{z-z^\dagger}{z}\right) d\tau$. This leads to an overall welfare impact of $d\tau Pr(z \geq z^\dagger | 1_\gamma(z) = 1)E\left[\frac{z\varepsilon\tilde{\tau}(z)}{1-A(z)+\varepsilon(T'-A)}\frac{z-z^\dagger}{z}|z \geq z^\dagger, 1_\gamma(z) = 1\right]$, where $\tilde{\tau}(z) = T'(z) + g(z)(A(z) - T'(z)) = (1 - g(z))T'(z) + g(z)A(z)$.

Putting this together, the overall effect of an increase $d\tau$ in the marginal tax rate on all incomes above $z^\dagger$ is:

$$
\begin{aligned}
&Pr(z \geq z^\dagger)E\left[(z - z^\dagger)(1 - g(z))|z \geq z^\dagger\right] \\
&-Pr(z \geq z^\dagger)(1 - \bar{\gamma}_I(z^\dagger))E\left[\frac{z\varepsilon T'(z)}{1 - T'(z) + z\varepsilon T''(z)}|z \geq z^\dagger, 1_\gamma(z) = 0\right] \\
&-Pr(z \geq z^\dagger)\bar{\gamma}_I(z^\dagger)E\left[\frac{z\varepsilon\tilde{\tau}(z)}{1 - A(z) + \varepsilon(T' - A)}\frac{z - z^\dagger}{z}|z \geq z^\dagger, 1_\gamma(z) = 1\right]
\end{aligned}
$$

Note that $\tilde{\tau}(z) \leq T'(z)$ when $g(z) > 0$ and $T'(z) \geq A(z)$. Thus,

$$
\frac{z\varepsilon T'(z)}{1 - T'(z) + z\varepsilon T''(z)} = -\frac{dz}{d(1 - T')}|_{1_\gamma=1} > \frac{dz}{d(1 - A)}|_{1_\gamma=0} = \frac{z\varepsilon\tilde{\tau}(z)}{1 - A(z) + \varepsilon(T'(z) - A(z))}
$$

whenever $1 - T'(z) + z\varepsilon T''(z) < 1 - A + \varepsilon(T'(z) - A(z))$. This occurs at each point z at which T is not too convex. In particular, this inequality holds for any point z on a linear part of the schedule. This establishes that increasing marginal tax rates, particularly in the top bracket, generates higher welfare gains in the presence of more ironers when the tax schedule is progressive ($T'(z) > A(z)$ over the income range under consideration).

D.3.3 Top Marginal Tax Rate

We now follow Saez (2001) to derive the top marginal tax rate. We assume that $\lim_{z\to\infty} T'(z)$ exists and is finite. This implies that $\lim_{z\to\infty} T'(z) - A(z) = 0$ and that $\lim_{z\to\infty} T''(z) = 0$. We also assume that the elasticity $\varepsilon(z)$ converges to $\bar{\varepsilon}$. Finally, we assume that the social marginal welfare weights for the top converge to $\bar{g}$ and that the propensity to iron is uncorrelated with earnings ability at the top.

We use the Saez (2001) result that $\lim_{z^\dagger\to\infty} E[z|z \geq z^\dagger]/z^\dagger = a/(a-1)$, where a is the Pareto parameter of the income distribution. In the limit, the effect of an increase $d\tau$ in the marginal tax rate on all incomes above $z^\dagger$ is then

$$Pr(z \geq z^\dagger)E\left[(z - z^\dagger)(1 - \bar{g})|z \geq z^\dagger\right]$$
$$-Pr(z \geq z^\dagger)(1 - \bar{\gamma}_I(z^\dagger))E\left[\frac{z\bar{\varepsilon}T'}{1 - T'}|z \geq z^\dagger\right]$$
$$-Pr(z \geq z^\dagger)\bar{\gamma}_I(z^\dagger)E\left[\frac{z\bar{\varepsilon}T'}{1 - T'}\frac{z - z^\dagger}{z}|z \geq z^\dagger\right]$$

Note that we do not condition on 1_γ in the second and third lines because the schedule is approximately linear at the top, and thus ironers and non-ironers have the same distribution of earnings as long as the propensity to iron is not correlated with earnings ability at the top. Thus, for $z_m := E[z|z \geq z^\dagger]$

$$(1 - \bar{g})(z_m - z^\dagger) - \frac{T'}{1 - T'}\varepsilon\left(z_m - \bar{\gamma}_I z^\dagger\right) = 0$$

from which it follows that

$$\begin{aligned}
\frac{T'}{1 - T'} &= \frac{(1 - \bar{g})(z_m - z^\dagger)}{\bar{\varepsilon}(z_m - \bar{\gamma}_I z^\dagger)} \\
&= \frac{(1 - \bar{g})(z_m/z^\dagger - 1)}{\bar{\varepsilon}(z_m/z^\dagger - \bar{\gamma}_I)} \\
&= \frac{(1 - \bar{g})\left(\frac{a}{a-1} - 1\right)}{\bar{\varepsilon}\left(\frac{a}{a-1} - \bar{\gamma}_I\right)} \\
&= \frac{(1 - \bar{g})}{\bar{\varepsilon}(a - \bar{\gamma}_I a + \bar{\gamma}_I)} \\
&= \frac{1 - \bar{g}}{[(1 - \bar{\gamma}_I)a + \bar{\gamma}_I]\bar{\varepsilon}}
\end{aligned}$$

Note that since the Pareto parameter $a > 1$, the optimal top tax rate is increasing in the propensity to iron. Liebman and Zeckhauser (2004) prove a special case of this result for $\bar{\gamma}_I = 1$: in this case, $\frac{T'}{1-T'} = \frac{1-\bar{g}}{\bar{\varepsilon}}$ at the top.

D.3.4 Optimal Income Tax Derivation

Let $w_N^\dagger$ be the wage of the non-ironers earning $z^\dagger$ and let $w_I^\dagger$ be the wage of the ironers earning $z^\dagger$. Let $z(w, 1_\gamma)$ denote the income chosen by a type $(w, 1_\gamma)$.

For simplicity, we assume here that the propensity to iron is independent of earnings ability w. Let f be the conditional density function of w and let F be the cumulative density function. Let H be the distribution over types $(w, 1_\gamma)$. In terms of wages, the welfare impact of increasing the tax rates by $d\tau$ on all incomes $z \geq z$ is

$$
\begin{aligned}
dW = & -(1-\gamma_I)\int_{w\geq w_N^\dagger} T'(z(w))\frac{dz(w)}{d(1-\tau)}f(w)dw \\
& -(1-\gamma_I)\int_{w\geq w_I^\dagger} T'(z(w))\frac{dz(w)}{d(1-\tau)}f(w)dw \\
& -\int_{z(w,1_\gamma)\geq z(w_N^\dagger,0)}(1-g(z)))(z-z(w_N^\dagger,0))dH(w)
\end{aligned}
$$

The above has to be equal to zero at the optimum for all $w^\dagger$. Thus the derivative of the above with respect to $w^\dagger$ must also equal zero. Differentiating it with respect to $w^\dagger$ leads to

$$
\begin{aligned}
0 = & (1-\gamma_I)T'(z(w_N^\dagger))\frac{dz(w,0)}{d(1-\tau)}|_{w=w_N^\dagger}f(w) + \gamma_I\int_{w\geq w_I^\dagger}\tilde{\tau}(w)\left(\frac{dz(w,0)}{dw}\right)\frac{dz}{d(1-A)}\frac{1}{z(w,1)}f(w) \\
& -\int_{z(w,\gamma)\geq z(w_N^\dagger,0)}(1-g(w,\gamma)))\left(\frac{dz(w_N^\dagger,0)}{dw_N^\dagger}\right)dF \\
& = (1-\gamma_I)T'(z(w))\frac{dz(w,0)}{d(1-\tau)}|_{w=w_N^\dagger}f(w_I^\dagger) + \gamma_I(1-T')\frac{\varepsilon+1}{\varepsilon w_I^\dagger}\frac{dz(w,0)}{d(1-\tau)}|_{w=w_N^\dagger}\int_{w\geq w_I^\dagger}\tilde{\tau}(w)\frac{dz}{d(1-A)}\frac{1}{z(w,1)}f(w)dw \\
& + -(1-T')\frac{\varepsilon+1}{\varepsilon w_N^\dagger}\frac{dz(w,0)}{d(1-\tau)}|_{w=w_N^\dagger}\int_{z(w,1_\gamma)\geq z(w^\dagger,0)}(1-g(w,\gamma)))dH(w) \qquad (2)
\end{aligned}
$$

For $\gamma_I < 1$, rearranging yields

$$
\begin{aligned}
\frac{T'(z^{\dagger)}}{1-T'(z^\dagger)} = & -\frac{\gamma_I}{1-\gamma_I}\frac{\varepsilon+1}{\varepsilon}\frac{1-F(w_I^\dagger)}{w_N^\dagger f(w_N^\dagger)}E\left[\tilde{\tau}(w)\frac{dz(w,1)}{d(1-A)}\frac{1}{z(w,1)}|z(w,1)\geq z^\dagger\right] \\
& + \frac{1}{1-\gamma_I}\frac{\varepsilon+1}{\varepsilon}\frac{1-\gamma_I F(w_N^\dagger)-(1-\gamma_I)F(w_I^\dagger)}{w_N^\dagger f(w_N^\dagger)}E\left[(1-g(z)|z\geq z^\dagger\right].
\end{aligned}
$$

Instead, when $\gamma_I = 1$, equation (2) reduces to

$$
\int_{w\geq w_I^\dagger}\tilde{\tau}(w)\frac{dz}{d(1-A)}\frac{1}{z(w,1)}f(w)dw - \int_{w\geq w_I^\dagger}(1-g(z(w)))f(w)dw = 0
$$

Differentiating with respect to $w_I^\dagger$ yields

$$
\frac{\varepsilon\tilde{\tau}(w_I)}{1-A+\varepsilon(T'-A)} = (1-g(z^\dagger))
$$

Rearranging generates $\frac{A}{1-A} = \frac{1-g(z)}{\varepsilon}$.

E Welfare Simulations: Robustness Analyses

Alternative Strengths of Redistributive Preferences: Our simulations assume individual utility takes the form $U(z) = log(z-T(z)-\frac{(z/w)^{1+k}}{1+k})$, referred to as "Type 1" utility functions in Saez (2001). While this functional form is common in the public finance literature, one might argue that the assumption of log curvature imposes greater redistributive preferences than may exist in practice. To explore the sensitivity of our conclusions to weaker demand for redistribution, we reconduct our simulation with utility of the form $U(z) = (z - T(z) - \frac{(z/w)^{1+k}}{1+k})^{(1-\rho)}/(1-\rho)$. Log utility corresponds to the case where $\rho = 1$, we reestimate our primary tables under the assumptions that $\rho = 0.5$ or $\rho = 0.25$. As illustrated by these tables, the qualitative importance of both the presence of ironing and its interaction with simplification policies remains.

Table A12: Revenue and Welfare Effects of Ironing: Alt. Redistributive Preferences

Structural Elasticity ($\frac{1}{k}$)	Increase in Tax Rev. (%)	*Net Welfare Increase (%)* Low λ $\lambda = U'_{50}$	— $\lambda = \bar{U}'$	High λ $\lambda = U'_{90}$
Lower Redistributive Preferences: $\rho = 0.5$				
1/2	3.7	3.1	3.2	3.4
1/3	2.5	2.1	2.2	2.3
1/4	1.9	1.6	1.7	1.8
1/5	1.6	1.3	1.4	1.5
Lowest Redistributive Preferences: $\rho = 0.25$				
1/2	3.7	3.0	3.0	3.2
1/3	2.5	2.1	2.1	2.2
1/4	1.9	1.6	1.6	1.7
1/5	1.6	1.3	1.3	1.4

Notes: The numbers presented contrast the revenue collected or welfare attained when comparing a population with perfect tax perceptions against one in which 43% of filers apply the ironing heuristic. Assumed utility model: $U(z) = (z - T(z) - \frac{(z/w)^{1+k}}{1+k})^{(1-\rho)}/(1-\rho)$. The top panel sets $\rho = 0.5$ and the bottom panel sets $\rho = 0.25$. The first column presents the structural elasticity (1/k). The second column presents the additional government revenue collected when the ironers are present. The final three columns present estimates of the increase in social welfare attained due to the presence of ironers, under alternative assumptions on the cost of public funds. Welfare effects are expressed as the percentage of total tax revenues that a social planner would pay to avoid converting all ironers to correct forecasters.

Table A13: Revenue and Welfare Effects Changing to Flat Tax: Alt. Redistributive Preferences

Structural Elasticity ($\frac{1}{k}$)	*All correct forecasters* Δ Tax Rev. (%)	Δ Welfare (%)	*43% ironers* Δ Tax Rev. (%)	Δ Welfare (%)
Lower Redistributive Preferences: $\rho = 0.5$				
1/2	5.2	-2.6	2.9	-5.4
1/3	3.3	-4.9	1.9	-6.7
1/4	2.5	-6.0	1.4	-7.3
1/5	1.9	-6.6	1.1	-7.7
Lowest Redistributive Preferences: $\rho = 0.25$				
1/2	5.2	2.3	2.9	-0.7
1/3	3.3	-0.3	1.9	-2.3
1/4	2.5	-1.5	1.4	-3.0
1/5	1.9	-2.3	1.1	-3.5

Notes: This table summarizes the revenue collected or welfare attained as a result replacing the progressive tax schedule with a linear schedule that would be revenue-neutral assuming no change in behavior. Assumed utility model: $U(z) = (z - T(z) - \frac{(z/w)^{1+k}}{1+k})^{(1-\rho)}/(1-\rho)$. The top panel sets $\rho = 0.5$ and the bottom panel sets $\rho = 0.25$. The first column presents the structural elasticity (1/k). The second and third columns present the additional government revenue and welfare, respectively, resulting from the tax-rate change under the assumption of perfect tax perceptions. The fourth and fifth columns provide analogous calculations under the assumption that 43% of the population irons. Welfare effects are expressed as the percentage of total tax revenues that a social planner would pay to avoid going to the flat tax.

Alternative Flat-Tax Rates: Table 6 analyzes the welfare consequences of moving to a flat tax. The imposed tax rate of 11.06% would be revenue neutral *assuming no behavioral response*. In practice, a policymaker aiming to implement a revenue-neutral flat tax may tailor the rate to account for elastic labor supply. We analyze the sensitivity of our conclusions to rates tailored for these purposes in Table A14. The top panel analyzes the welfare consequences of moving to a flat tax with a rate of 10.49%—the rate that would be revenue neutral assuming optimal response governed by a structural elasticity of $\frac{1}{2}$, our most elastic specification. The bottom panel analyzes the welfare consequences of moving to a flat tax with a rate of 10.85%—the rate that would be revenue neutral assuming optimal response governed by a structural elasticity of $\frac{1}{5}$, our least elastic specification. Across both exercises, we continue to substantially larger welfare costs of moving to the flat tax in the presence of ironing. Under our preferred elasticity of $\frac{1}{3}$, the presence of ironing increases the welfare costs of the flat tax by 11% and 13%, respectively. For comparison, the analysis in Table 6 suggests that the presence of ironing increases welfare costs by 14%.

Table A14: Revenue and Welfare Effects Changing to Flat Tax: Alternative Rates

Structural	*All correct forecasters*		*43% ironers*	
Elasticity	Δ Tax Rev.	Δ Welfare	Δ Tax Rev.	Δ Welfare
$(\frac{1}{k})$	(%)	(%)	(%)	(%)
Tax rate: 10.49% (revenue neutral when elasticity = $\frac{1}{2}$)				
1/2	0.0	-12.3	-2.1	-14.6
1/3	-1.8	-14.1	-3.2	-15.6
1/4	-2.7	-14.9	-3.7	-16.1
1/5	-3.2	-15.4	-4.0	-16.3
Tax rate: 10.85% (revenue neutral when elasticity = $\frac{1}{5}$)				
1/2	3.2	-10.8	1.1	-13.2
1/3	1.4	-12.5	0.0	-14.1
1/4	0.5	-13.4	-0.5	-14.5
1/5	0.0	-13.8	-0.8	-14.8

Notes: This table reproduces the analysis of Table 6 under alternative assumptions on the rate of the flat tax imposed. Whereas Table 6 analyzes a flat tax that would be revenue neutral assuming no behavioral response, this table considers reforms that would be revenue neutral assuming optimal behavior governed by the maximum and minimum elasticities of our considered range.

Omission of Very-High-Income Filers: Due to our sampling structure, our within-sample income distribution closely approximates the U.S. income distribution, with the caveat of being truncated at $250,000. While filers above this income threshold account for only 2% of tax returns, they pay 46% of all federal income tax revenue.[4] Their exclusion influences our estimates in two important ways.

First, if top tax filers exhibit the propensity to iron documented in this paper, the welfare gains associated with ironing become more dramatic. Since the social planner down-weights individual taxpayers' misoptimization costs by their social marginal welfare weights, which are typically assumed to tend to zero for sufficiently rich filers. The welfare-relevant consequence of debiasing a top-2-percent filer would therefore be nearly entirely driven by the fiscal externality component of the equation, guaranteeing that this taxpayers' individual contribution to the welfare effect of debiasing would be negative. We believe that our focus

[4]See https://www.irs.gov/uac/soi-tax-stats-individual-income-tax-returns#prelim.

on within-sample analysis provides the most principled and conservative approach to approximating welfare costs, as it does not rely on untested assumptions that the absolute richest filers exhibit the same misperceptions measured in our population. However, if they do, their effect would only increase the quantitative importance of accounting for ironing.

Second, however, notice that in several of our calculations in Table 5, we benchmark revenue losses or welfare effects against total government revenue. The lack of top-2-percent tax filers in our sample would naturally lead our within-sample revenue forecasts to underestimate true total revenue. Since the omitted range of returns pays 46% of total taxes, rescaling columns 2-4 of Table 5 by 0.54 corrects for their omitted revenue. After this correction, our preferred estimate of the welfare benefit of ironing implies an equivalence with a 1.2% government revenue windfall, and thus still represents a large welfare consideration relative to commonly-studied interventions.

References

Saez, Emmanuel, "Using Elasticities to Derive Optimal Income Tax Rates," *The Review of Economic Studies*, 2001, *68* (1), 205–229.

_ , "The Desirability of Commodity Taxation Under Non-Linear Income Taxation and Heterogeneous Tastes," *Journal of Public Economics*, 2002, *83* (2), 217–230.

Villas-Boas, J. Miguel, "Comparative Statics of Fixed Points," *Journal of Economic Theory*, 1997, *73*, 183–198.