Public's Tax Preference

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MASTERS IN COMPUTATIONAL SOCIAL SCIENCE

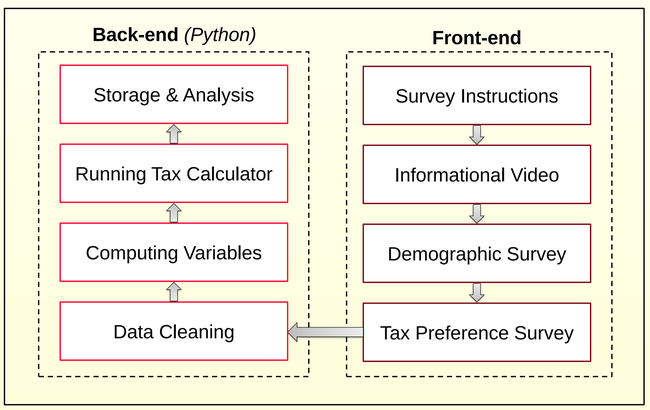
Research Question

1. **Do people favor tax structures that benefit them directly?**
2. **How progressive or regressive are tax preferences?**

Novelty of the study:

1. Open source tax calculator (python) [1] for revenue, income estimation (previous studies use simpler low accuracy models)
2. Suits index for progressivity (previous surveys use simple run-over-rise indices)
3. Thorough investigation of the effect of demographics

Survey Design



F1: Survey Flow Chart

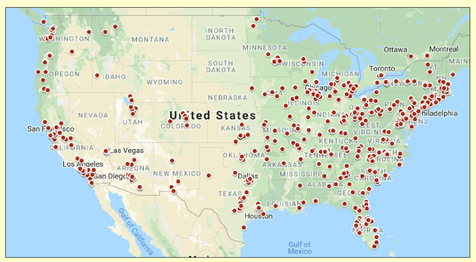
Demographic Variables:

Gender, Age, Political Affiliation, Education, Race, Income, Marital Status, # Children, primary earner or not

Tax Policy Variables:

1. Max Taxable Earnings for Social Security
2. Long Term Capital Gains (LTCG) Taxes (3)
3. Personal Income (PI) Tax (7)

Data



F2: Geographic Dispersion of Respondents

More Data

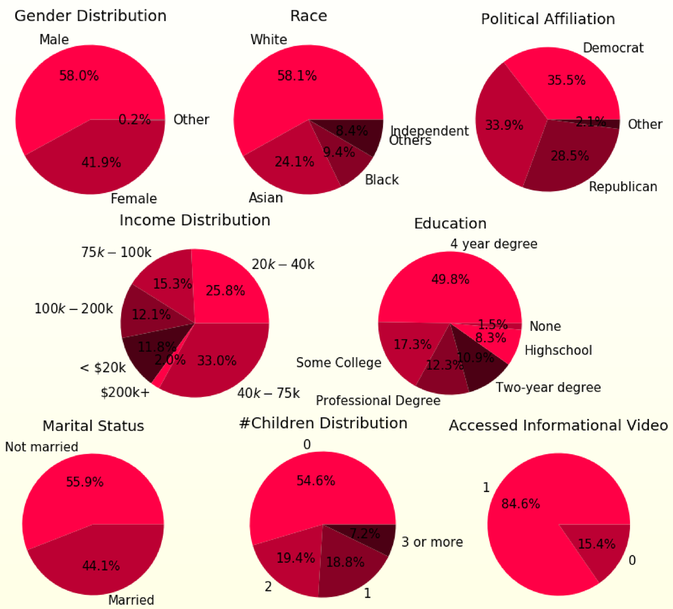
Summary Statistics

Total number of observations: **1080**

	Mean	*5th Perc*	*95th Perc*
Age	35	23	58
Max Taxable SS	165623	50000	500000
LTCG Tax 1	20%	0%	75%
LTCG Tax 2	27%	6%	76%
LTCG Tax 3	33%	10%	80%
PI Tax 1	21%	0%	76%
PI Tax 2	24%	5%	79%
PI Tax 3	30%	10%	80%
PI Tax 4	32%	12%	78%
PI Tax 5	39%	15%	81%
PI Tax 6	42%	15%	78%
PI Tax 7	46%	15%	84%

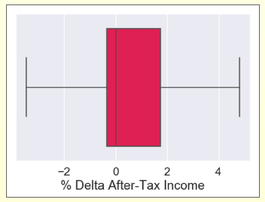
T1: Descriptive statistics for continuous variables

F3: Composition for the discrete variables:

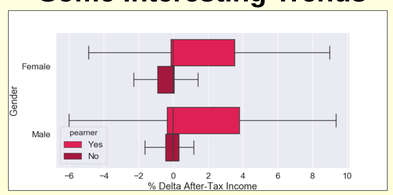


Results

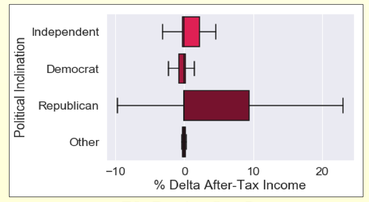
Some Interesting Trends



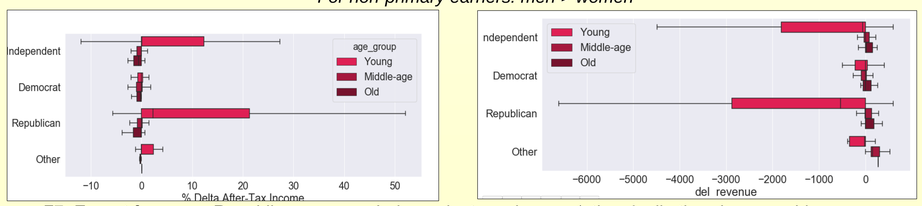
F4: 50% respondents chose plans favoring them financially



F5: After-tax change in income
For primary earners: men = women
For non-primary earners: men > women



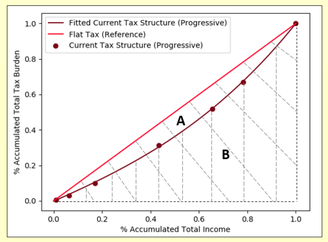
F6: R > I > O = D
(at choosing self-serving policies)



F7: Except for young Republicans, young Independents and young 'others', all other demographic groups on an average exhibit pro-tax behavior

Progressivity Calculation

***All results based on 2-sample t-tests conducted on sample size of at least 25 and significant at the p=0.05 level**



F8: Suit's index calculation for current policy

Calculated using Suit's Index [2]. Given by (refer F8):

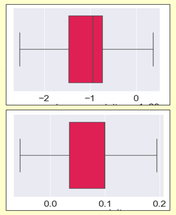
$$S_P = \frac{A - B}{A}$$

It is equal to 0 for flat, positive for progressive and negative for regressive tax structures. Data used for income distribution required to calculate accumulated income and tax burden is the aggregated IRS tax-returns data [3]. The % population in each bracket is assumed to be proportional to the % of tax returns filed from the bracket.

Sp for current policy (F8) = 0.1861

Tax Bracket	% Population
1	22%
2	22%
3	18%
4	22%
5	12%
6	4%
7	1%

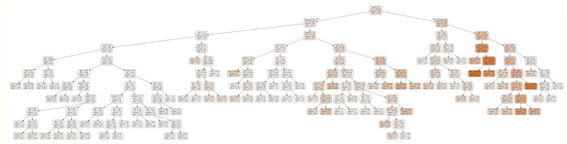
T2: Aggregate population data used in Sp calculation



F9: Majority prefer regressive PI tax (up) & progressive LTCG tax (down)

More Results

Decision Tree Prediction:



F10: Optimal decision tree model to predict change in after-tax income

We try to predict the difference in revenue, PI/LTCG progressivity, and change in after-tax income for various demographic groups. 2 models: Decision Tree and Random Forest were tuned and fit. The cross-validation MSE is as follows:

CV MSE	Decision Tree	Random Forest
Change in after-tax income	286.4	256.5
Change in total revenue	1553353.7	1348388.7
PI Progressivity	1.54	1.54
LTCG Progressivity	0.0081	0.0078

Clearly, Random Forest gives a better prediction accuracy.

Conclusion

1. Conclusions about demographic trends made from the direct effect of a demographic variable cab be erroneous, interaction effects are also significant
2. People prefer regressive PI tax and progressive LTCG tax. The current political narrative revolving around PI tax must be reevaluated
3. Random Forest gives better prediction accuracy over Decision Trees in predicting tax-attitude from demographic variables

Limitations + Future Work

1. Some sub-groups are underrepresented, a larger survey can reveal more interesting patterns and validate the current patterns
2. Trying other models (e.g. clustering) to improve prediction accuracy and testing out prediction accuracy on a new dataset to test robustness

References

[1] https://github.com/PSLmodels/Tax-Calculator

[2] Suits, Daniel B. "Measurement of tax progressivity." The American Economic Review 67, no. 4 (1977): 747-752

[3] Pew Research Center's internal analysis of IRS data ("U.S. income tax is progressive, but enough to be 'fair'?" Oct 6, 2017)

Acknowledgements

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