Social Security MTR Calculation:

Introduction:

This document explains the process in which we calculate the marginal tax rates (MTR) for Social Security for individuals in the CPS dataset.

Methodology:

We begin by excluding all individuals from the MTR calculation who are not in the labor force, which we define by three criteria:

1. Their reported age is between 18 and 65 inclusive

2. Is not currently enrolled as a part-time or full-time student (a\_ftpt from CPS)

3. Earned income is greater than 0

Note: We define earned income as the sum of 'wsal\_val', 'semp\_val', and 'frse\_val' from CPS

Once we exclude those who aren’t in the labor force, we use the Mincer earnings function1 to predict the earnings in a given year of each individual as a function of schooling and experience. This equation is given by

where *y* is earnings, *y*0 is the earnings of somebody with no education or experience, *S* is years of education, and *X* is years of work experience. To specify *S* in our calculation, we use the variable ‘a\_hga’ from the CPS dataset and assign each possible category of education a number, which we define as YrsPstHS in the python code, to reflect how many years beyond high school it takes to finish.

|  |  |  |  |
| --- | --- | --- | --- |
| Degree Type | YrsPstHS or '*S'* | Degree Type | YrsPstHS or '*S'* |
| Less than high school | 0 | Bachelor’s degree | 5 |
| High school graduate | 1 | Master’s degree | 7 |
| Some college but no degree | 2 | Professional school degree | 10 |
| Associate degree | 3 | Doctorate degree | 10 |

We then assume that each individual in the labor force maintains the same level of education for the remainder of their lives and began working immediately upon completing their education. Thus we define experienceas

(Example: An individual aged 34 received a master’s degree. Then *X* would be 34-7-17 = 10.)

Now that these variables are clearly defined, we were able to perform a regression using the variables earned\_income, YrsPstHS, experience, and experience\_squared to determine the coefficients *r,* β1, and β2. With these coefficients, we can then predict an individual’s earnings in a given year of their life.

The results of the regression are below.

OLS Regression Results

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Dep. Variable: earned\_income R-squared: 0.183

Model: OLS Adj. R-squared: 0.182

Method: Least Squares F-statistic: 4421.

Date: Sat, 27 Aug 2016 Prob (F-statistic): 0.00

Time: 15:16:31 Log-Likelihood: -82210.

No. Observations: 59407 AIC: 1.644e+05

Df Residuals: 59403 BIC: 1.645e+05

Df Model: 3

Covariance Type: nonrobust

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coef std err t P>|t| [95.0% Conf. Int.]

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const 9.1374 0.014 665.145 0.000 9.110 9.164

YrsPstHS 0.1576 0.002 98.161 0.000 0.154 0.161

experience 0.0671 0.001 52.443 0.000 0.065 0.070

experienceSquared -0.0012 2.77e-05 -42.580 0.000 -0.001 -0.001

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Omnibus: 24077.988 Durbin-Watson: 1.951

Prob(Omnibus): 0.000 Jarque-Bera (JB): 177423.838

Skew: -1.779 Prob(JB): 0.00

Kurtosis: 10.682 Cond. No. 2.93e+03

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With these coefficients we can then obtain a vector of earnings for each year of an individual’s working life until the present year simply by plugging in the individual’s education, and their work experience in any given year. This vector of earnings can then be used to estimate the individuals estimated monthly social security benefit from an online calculator at the Social Security Administration website at <https://www.ssa.gov/planners/retire/AnypiaApplet.html>. Our script visits this website, fills in the lifetime earnings and birthday, and gives an estimated monthly social security benefit. Then we convert this benefit to represent a lifetime benefit by multiplying by 12 to make it yearly, then by the number of years remaining in the individual’s lifetime, which we assume to be 20.

Once we get this total lifetime benefit, we add $10000 to the current year (2014) in the lifetime earnings vector and recalculate the monthly benefit on the website. The reason that we add $10000 is that anything less than that doesn’t yield any difference to the monthly benefit. Finally, we take this new benefit, multiply by 240 to make it a lifetime benefit, take the difference between the old and new lifetime benefit, and divide that difference by 10000 to get the marginal tax rate for that individual. We perform this set of steps for each individual in the labor force of the CPS dataset.

1. Mincer, Jacob (1958). "Investment in Human Capital and Personal Income Distribution". [*Journal of Political Economy*](https://en.wikipedia.org/wiki/Journal_of_Political_Economy). **66** (4): 281–302. [doi](https://en.wikipedia.org/wiki/Digital_object_identifier):[10.1086/258055](https://dx.doi.org/10.1086%2F258055). [JSTOR](https://en.wikipedia.org/wiki/JSTOR) [1827422](https://www.jstor.org/stable/1827422).