Econ 807
Assignment 4: Negative Income Tax

Instructions: Prepare this assignment in the form of a typed report. Attach your code in an appendix.

1. Consider an economy populated by three types of individuals: high-skill (college educated), medium-skill (highschool educated), and low-skill (dropouts). In Canada, for individuals in their peak earning years, gross yearly earnings, yearly labour supply, (implied) hourly wages, and average tax rates are given in the following table:

	Earnings	Hours	Hours/5840	Wage Rate	Tax Rate
College	\$75,000	2400	0.40	\$31.00	0.40
Highschool	\$50,000	1920	0.33	\$26.00	0.30
Dropouts	\$25,000	1440	0.25	\$17.00	0.20

Note that $5840 = 365 \times 16$ (the number of discretionary hours available per year). Assume that 25% of the population has a college education, 50% have a highschool education, and 25% are highschool dropouts. Suppose that preferences are given by:

$$u_i(c_i, l_i) = \ln(c_i) + \psi_i \ln(l_i),$$

for $i = 1, 2, 3$ (college, highschool, dropouts, respectively). Each individual faces the following budget constraint:

$$c_i = (1 - \tau_i) w_i n_i + T_i,$$

where T_i is a per capita lump-sum transfer from the government and $n_i + l_i = 5840$. The government's budget constraint is given by:

$$\sum_{j=1}^{3} \lambda_i (\tau_i w_i n_i - T_i) = 0,$$

where λ_i represents the fraction of the population of type i. Assume that $T_1 = 0.9 T_2$ and $T_3 = 1.1 T_2$ (which is roughly consistent with the data).

(a) Use the theory and the data above to estimate the parameters ψ_i (choose ψ_i such that the model replicates the observed distribution in hours worked across education groups). I have provided the code to perform such an exercise on the course web page. According to my calculations, I get $\psi_1 = 1.1068$; $\psi_2 = 1.4212$; $\psi_3 = 1.8249$ (approximately a 25% difference across education groups). You may get slightly different numbers, depending on how you go about fitting the model to the data. Use a table to report the actual and predicted levels for: earnings; net income; and labour supply.

(b) Given your estimated parameters for ψ_i, use the model here to estimate the quantitative impact of replacing the current tax system with a negative income tax, with τ set to the average tax rate currently in place (i.e., $\tau = 0.30$). Report what

happens to gross earnings, after-tax income, and labour supply. Explain. Calculate the welfare effects of such a policy change; i.e., who would benefit and who would lose? Beginning with the current tax system, what fraction of consumption would each education type be willing to pay for having the negative income tax policy implemented (note: this may be a negative number)? Make sure to describe how you go about making these calculations.

(c) Suppose that you are a policymaker interested in designing an 'optimal' negative income tax system. Assume that your social welfare function is based on the *Rawlsian* criterion:

$$SW(\tau) = \sum_{j=1}^{3} \lambda_i u_i(c_i(\tau), l_i(\tau)).$$

Calculate the value of social welfare for a number of different values for τ and report the τ that (approximately) maximizes social welfare. Compare this social welfare value with the social welfare associate with the current tax system. What fraction of consumption would the typical person be willing to pay in order to move from the current tax system to an optimal negative income tax system? Again, make sure that you describe how you go about making these calculations.