Economics 792. Dynamic labour supply

Andrew Shephard

Use `dynamic_labour_supply_data.csv` from the course website, which contains a balanced panel of 1,000 couples in comma-separated values format. Each line contains (in this sequence): *i)* An individual identifier, ranging from 1 to 1,000; *ii)* The (re-centred) age of the woman (in years), ranging from 1 to 15; *iii)* An employment indicator (equal to 1 if employed, 0 otherwise); *iv)* Female earnings, expressed in units of $10,000 if she works, otherwise equal to -1; *v)* The income of her husband, expressed in units of $10,000; *vi)* Labour market experience defined as the total number of years the woman has worked so far (not including the current period); *vii)* Female years of schooling; and *viii)* An indicator equal to 1 if the individual is non-white, 0 otherwise.

1. Using the dataset provided, estimate a dynamic participation model in a programming language of your choice. Your model should have a similar structure to the one discussed in class and contain no more than 12 parameters (this is an upper bound, not a target). Assume that the last decision period is when the wife is age 15. You must specify and estimate a utility function and a log-wage function. As in class, the wage function is log normally distributed and reported wages are measured with a multiplicative error that is also log normally distributed. The discount factor is 0.95. You should assume that the income process of the husband (as given in the data) is known with perfect foresight and is free of measurement error. Assume that the first $30,000 dollars of female earnings are untaxed. Any earnings exceeding this amount are taxed at the constant marginal tax rate of 50%. For simplicity, we assume that male earnings are not taxed.

2. Assess model fit by simulating data from your estimated model. In simulating data, you should perform 50 replications for each household. Then, compare the simulations to the actual data in terms of: *i)* The average number of period working over the sample period overall and by whether or not the woman has a) less than 12 years, b) 12, c) 13–15, and d) 16+ years of schooling. *ii)* The fraction of women working at each age; *iii)* The fraction of women working by work experience levels (a) 10 years or less, (b) 11-20, (c) 21+; *iv).* The mean wage of working women overall, by the four education levels above, and by age.

3. Suppose that the government reforms the tax system, simultaneous reducing the tax-free allowance to $20,000, and raising the marginal tax rate to 70% on earnings exceeding this amount. Male earnings continue to be untaxed. In each of the following experiments, present life-cycle employment and wage profiles (i.e. employment and accepted wages by age), and explain any differences that you find across them and relative to those under the original tax system. Do not add wage measurement error in any of these experiments.

   (a) Imposing the new tax system on the population from the initial period.

   (b) Imposing the new tax system on the population from period (equivalently age) $t = 8$ (the tax system described in part 1 exists in periods $1, \ldots, 7$), when individuals expect this change to happen with certainty from the initial period (perfect foresight).

   (c) Impose the new tax system on the population from period $t = 8$ (again, the tax system described in part 1 exists in periods $1, \ldots, 7$), but when this change is completely unanticipated but will persist following the reform at $t = 8$ (static expectations).