

**LABOR ECONOMICS
 PROBLEM SET I**

1. This problem asks you to extend the standard one person static labor supply problem to a two-earner family. Consider a family with the following utility function:

$$U = U(c_f + c_m, l_f, l_m)$$

Utility is a function of the sum of goods consumed by the male and female members of the family and each members leisure. Each person has a time endowment T_i and faces a wage w_i , where $i = f, m$. The family also has non-labor income y and faces a price p for consumption goods.

- a) What is the family budget constraint? Is there any point to the distinction between c_f and c_m ?
- b) Set up the Lagrangean and solve for the first-order conditions. Interpret.
- c) Briefly state a sufficient condition (restriction on the utility function) for the first-order conditions to determine labor supply $h_i(w_f, w_m, p, y)$ for male and female family members.
- d) Write down the uncompensated labor supply response of females and males

- $\frac{\partial h_i}{\partial w_f}$ to a change in female wages
- $\frac{\partial h_i}{\partial w_m}$ to a change in male wages

in terms of substitution and income effects. Rename the substitution effect S_{ij} for worker i 's response to a change in j 's wage. What are the likely signs of the four possible substitution effects? What are the classical restrictions on the substitution matrix?

- e) Totally differentiate the labor supply functions for females and males, assuming $dp = 0$. Substitute your results from (d) to obtain

$$dh_i = S_{if} * dw_f + S_{im} * dw_m + B_i[h_f / dw_f + h_m / dw_m + dy]$$

where $B_i = -c_{h_i/c_i}$. (It's enough to do this for either females or males as the problem is symmetric). Use this equation and what you know about the Slutsky matrix to show that the introduction of a negative income tax must reduce family earnings, though it need not reduce both husbands' and wives' earnings.

- f) Describe a strategy for estimating income and substitution effects based on the equation above.
- g) Ashenfelter and Heckman (1974) estimate the coefficients S_{ij} and B_i (which they treat as fixed parameters) using three-stage least squares. Why is OLS inappropriate here?

Ashenfelter & Heckman report the following results:

	with no restrictions		restricting $S_{mf} = S_{fm}$	
Labor Supply of	dw_f	dw_m	dw_f	dw_m
Husbands	.139 (.090)	.110 (.056)	.127 (.067)	.106 (.043)
Wives	.972 (.385)	-.081 (.225)	1.233 (.273)	.127 (.067)

Do these results support the classical restrictions on the Slutsky matrix? How would you construct a formal statistical test of these restrictions?

h) The estimated income effects in the restricted model (not shown above) are -.102 and -.886 for husbands and wives, respectively. Does this imply that leisure is a normal good?

i) What are the approximate uncompensated cross effects in the restricted model and what do they add to our understanding of changes in male and female labor force participation? (Use the fact that mean hours, actually a labor force participation rate in this study, are .979 for men and .341 for women).

j) Suppose that instead of a family utility function, husbands and wives act to maximize their own utility, which may be a function of their spouses' consumption and leisure. How would you set up the resulting optimization problem? What does it mean for an allocation to be efficient in this model?

2. The presence of pre-school children complicates labor-supply decisions, especially for mothers.

a) Use a graph to show how a women's labor supply decisions are affected by child care costs, assuming she is the only adult in the household

b) Describe the impact of a lump-sum child allowance that is phased out as income or earnings rise. Compare this with the effect of publicly-provided child care for all, as is often found in Europe.

c) Is increasing the labor force participation of poor mothers an unambiguously desirable public policy goal?

3. Life-cycle labor supply

a) Derive the \bar{L} -constant labor supply and commodity demand functions for the MaCurdy (1981) utility function. To simplify notation, use time subscripts instead of parentheses. You can also assume the interest rate is fixed.

- i. What is the intertemporal substitution elasticity for this model? Why is this parameter necessarily (i.e., theoretically) positive? How do wages affect consumption? Why?
 - ii. What does this model predict about the behavioral response to the following sources of variation in wages: Cross-sectional variation associated with permanent differences in human capital; Wage increases generated by changes in labor market experience; Transitory shocks caused by changes in the macro economy; Changes in after-tax wages caused by a temporary NIT program; Job loss at age 50.
- b) Construct a PSID extract similar to the one used by Angrist (1991). PSID data are available through the Harvard-MIT Data Center at (<http://www.hmdc.harvard.edu/training/tutorials/download-data.html>); go to “virtual data center” and then “ICPSR.” Search for the PSID using the VDC search bar. Then look for “annual core data,” and extract a subset from the cross-year individual file).
- i. Calculate the grouped-data, Analysis of Covariance (fixed-effects), and OLS estimates of MaCurdy’s specification reported by Angrist (1991, Table 3). You should be able to replicate these estimates after replicating the sample selection criteria and estimation procedures, though in practice sample selection criteria may not be entirely unambiguous.
 - ii. What is the Angrist (1991) interpretation of the differences in results across methods? Why does Card (1994) take a skeptical view of the large positive intertemporal substitution elasticities that are generated by the grouped-data estimator in PSID data?