ARE 251/ECON 270A ASSIGNMENT 2B

ETHAN LIGON

This assignment asks you to work with others in the class to do some analysis of an LSMS dataset. This should be the same group and dataset that you constructed for Assignment 2a. The assignment below will also ask you work with consumption aggregates which you constructed for Assignment 1.

(1) Construct a household panel of data on the consumption aggregates you devised in Assignment 1, along with other data such as household income. (If expenditure data are collected at a higher than annual frequency, you may want to use periods in your panel shorter than a year). Using two or three figures and tables, provide some summary information regarding the panel, and particular regarding variation in income and expenditures.

(2) Conduct a simple analysis of variance: How much of the variance you observe in income and expenditures is generated by the passage of time in your panel? How much is strictly due to variation in the cross-section?

(3) Now, two households, each of which lives for two periods. Each derives utility from a von Neumann-Morgenstern utility function $U : \mathbb{R} \to \mathbb{R}$, and discounts future utility by a factor $\beta = 0.9$.

There are two possible states in each period t, denoted by $\omega_t \in \{1, 2\}$. Household i's endowment in period t and state ω_t is equal to $y_{it}(\omega_t)$. The probability that $\omega_t = 1$ is 0.5. Assume that $U(c) = \log(c)$. There is no storage, and each household interacts only with the other.

Each household's endowment in each of the two periods is given by:

		Household mod 2	
ω	t	1	2
1	1	1	3
2	1	5	7
1	2	2	4
2	2	4	2

a) Write down an event tree for this economy (i.e., enumerate the different date-states that can occur). Write down the commodity space (i.e., what are the goods that would appear as choice variables in the social planner's problem?).

b) Calculate the expected discounted utility for agent 2 if he simply consumes his endowment in each period.

c) Show that an income-pooling scheme can yield Pareto optimal outcomes. What is the minimum share that household two would accept as an inducement to participate in this scheme?

d) Using the fact that $\frac{U'(c_{it})}{\beta \mathrm{E} U'(c_{it+1})} = 1 + r_t$, compute implicit interest rates (in each of the two first-period states) given implementation of the income pooling scheme.

e) Do interest rates depend on shares?

f) Would we expect to observe any borrowing or lending between these two households?

(4) Keep the environment described above, but now suppose that instead of a pair of isolated households there are $2n$ households indexed by $i = 1, \ldots, 2n$, with odd-numbered households facing endowment realizations as for household 1 above, and even-numbered households facing realizations as for household 2. The probability of realizing the endowments listed for state 1 for household i is equal to p_i (instead of $1/2$), and is independent across households. The parameter p_i is, in turn, drawn from the uniform distribution on the open interval $(0, 1)$.

a) Just for this part, assume $n = 2$. Draw the event tree.

b) Show that if all households are permitted to engage in exchange with each other that in a competitive equilibrium an individual in household i will have consumption which will depend on p_i, but not on the households' endowment realization. In particular, show that each individual $j \in \{1, 2\}$ in household i in period t will have consumption realizations which take the form

$$\log c_{it}^j = \alpha_i + \nu_j + \eta_t,$$

where α_i can be thought of as a "household effect," ν_j reflects the distribution of resources in the household, and η_t reflects aggregate endowment shocks.

c) If all households are now permitted to engage in exchange with one another and n is large, what will prevailing interest rates in the first period be if there's full insurance?

d) Produce two Lorenz curves for this model economy in each of the two periods: The first for household level consumption inequality, the second for household level income inequality. Discuss the relationship between inequality over time, as well as on the differences between income and consumption inequality.

e) Produce two Lorenz curves for this model economy in each of the two periods: The first for individual level consumption inequality, the second for individual level income inequality. Discuss the relationship of these curves with the household level Lorenz curves.

f) Using the data from the dataset you're working with, test the predictions of the full risk-sharing model you derived above. What do these results suggest about the right way to measure poverty or inequality?

g) Compare and contrast the Lorenz curves from the data with the Lorenz curves from the model. What are the principal successes and failures of the model when it comes to explaining the patterns you've observed in the data?