ARE 251/Econ 270A Assignment 2A
Due December 1, 2011

Note that this is an assignment to be completed in groups; each group is responsible for turning in one write-up.

(1) Working with all of your classmates, partition the class into groups of three or four students (a "partition" is a collection of subsets of a group which is both exhaustive and exclusive). Identify all the members of the group of which you are yourself a member. Note that all members of each group will receive the same credit for completing this problem.

(2) Consider the farm-household model we've discussed in class. Assume that the household's preferences over n different consumption goods $\{x_1, \ldots, x_n\}$ depend on a utility function

$$U(x_1, \ldots, x_n) = \sum_{i=1}^{n} \alpha_i \frac{(x_i + \phi_i)^{1-\gamma_i} - 1}{1 - \gamma_i}.$$

Here, the parameters $\{\gamma_i\}$ govern the curvature of the n sub-utility functions associated with consumption of the various n goods. The parameters $\{\alpha_i\}$ govern the weight of the n sub-utilities in total utility, and the parameters $\{\phi_i\}$ 'translate' the commodity space in such a way to make it simple to accomodate subsistence levels for some goods, or more generally to control the marginal utility of consumption near zero for any of the goods.

a) Write down the maximization problem facing the farm-household in Kuhn-Tucker form, with λ denoting the Kuhn-Tucker multiplier associated with the the farm-household's budget constraint. Give an economic interpretation of the quantity λ—in particular, how is it related to utility?

b) Derive the Frisch demand system for the household. That is, calculate household demand for good i as a function of the parameter λ and of prices.

(3) Let w_i denote the share of expenditure category i in total expenditures $\bar{x}$. Consider the Working-Leser approach to estimating Engel curves; this involves assuming the following functional form:

$$w_i = a_i + b_i \log \bar{x}.$$

Consider also an alternative, with

$$\log w_i = a_i + b_i \log \bar{x}.$$

Under what assumptions regarding the parameters of the utility function derived above are one or another of specifications of Engel curves consistent with the Frisch demand system you derived? When these assumptions are satisfied, how are the 'reduced form' parameters (a_i, b_i) related to the 'structural' parameters of the utility function?

(4) Working with other students in your group, choose a country which has multiple rounds of LSMS data available (ideally forming a household panel). Grosh and Glewwe [1998] provides a useful (if somewhat dated) introduction to the use of these datasets. You can go to `http://iresearch.worldbank.org/lsms/lsmssurveyFinder.htm` to find which countries have multiple rounds of the survey, and which collect data

on income, food, and non-food consumption. Make sure your chosen dataset includes data on rural households.

(5) Still working with other students in your group, use the LSMS data you've chosen to construct consumption aggregates for food, non-food non-durables, housing, and non-housing durables. (You may find it useful to consult Deaton and Zaidi [2002].) Construct a table reporting summary statistics (means, extremes, variance) for each of these consumption aggregates.

(6) Using your LSMS data, and one of the Working-Leser type specifications described above, estimate Engel curves for each of the expenditure categories you've constructed above. Compare and contrast the demands across categories. (Feel free to augment the Working-Leser specification if this makes sense—for example, it would probably be wise to include controls related to household size and composition). Which specification for Engel curves do you prefer, and why?

(7) In the spirit of the tests advocated by Banks et al. [1997], plot the residuals from your estimation above against different functions of total expenditures (e.g., total expenditures, the logarithm of total expenditures squared). Is there evidence of misspecification? Discuss.

(8) Propose a specification of utility functions for your sample which is consistent with what you know about demand from your work on Engel curves above. What additional ways could you go about testing your specification using the data you have in your possession?

(9) Benjamin [1992] tests the hypothesis of separation between consumption and production among farm households in Indonesia by testing whether farm labor demand is independent of household composition. In a similar spirit, show that when the separation hypothesis is satisfied then consumption expenditures in different categories ought to depend only on total income, and not on the different components of this income.

(10) Using your result, test the separation hypothesis using your LSMS data. Report your results and discuss.

References

James Banks, Richard Blundell, and Arthur Lewbel. Quadratic Engel curves and consumer demand. *The Review of Economics and Statistics*, 79(4):527–539, 1997. ISSN 00346535. URL `http://www.jstor.org/stable/2951405`.

Dwayne Benjamin. Household composition, labor markets, and labor demand: Testing for separation in agricultural household models. *Econometrica*, 60(2):287–322, 1992. ISSN 00129682. URL `http://www.jstor.org/stable/2951598`.

A. Deaton and S. Zaidi. *Guidelines for Constructing Consumption Aggregates for Welfare Analysis*. World Bank Publications, 2002. URL `http://siteresources.worldbank.org/INTPRS1/Resources/Thematic-Workshops/415743-1089658785131/Training_2001-27-02_Deaton_ConsumpAgg_doc.pdf`.

Margaret E. Grosh and Paul Glewwe. Data watch: The World Bank's Living Standards Measurement Study household surveys. *The Journal of Economic Perspectives*, 12(1): 187–196, 1998. ISSN 08953309. URL `http://www.jstor.org/stable/2646946`.