

SUMMER 2012
PANEL DATA ECONOMETRICS (PHD.)
LAB S: NON-LINEAR PANEL DATA MODELS*

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Introduction

In this empirical exercise, we use panel data on urban households in Ethiopia to study the correlates and persistence of poverty. Most previous studies of poverty and poverty dynamics in Sub-Saharan Africa have focused on rural areas ¹. While important, the results and insights generated by these studies do not necessarily carry over to the urban context. Alem and Söderbom (2011) for instance show that, urban households may be more vulnerable than rural households to high food prices since little food production takes place in urban areas. On the other hand, labor market opportunities are likely to be more diverse in urban than in rural areas, implying that urban households are less dependent on the developments in a single sector. Since the range of occupations available in urban areas is relatively wide (at least compared to in rural areas), it may be important to consider intra-household heterogeneity in labor market status when studying urban poverty.

Previous studies of poverty have typically focused on the characteristics of the household head and use these as proxies for the underlying ability of the household to generate income. This may be appropriate in a rural context, where family members typically work on the farm. In urban Ethiopia, however, a focus solely on the characteristics of the household head may be too narrow. For instance, it could be that a household head is an uneducated housewife but

*This exercise is based on "Alem (2011). Poverty dynamics and intra-household heterogeneity in occupations: Evidence from urban Ethiopia. Department of economics, University of Gothenburg."

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¹See, e.g., Dercon & Krishnan (1998), Dercon, (2004), Dercon et al. (2005), Harrower & Hoddinott (2005), Barrett et al. (2006), Dercon (2006), Dercon (2008), Beegle et al. (2008), and Litchfield & McGregor (2008).

has educated and working children residing in the same house. Hence, it may be important to control for other household members' related variables in analyzing poverty in urban areas.

Alem (2011) therefore uses detailed data on the occupations of all household members to investigate the role of intra-household heterogeneity in jobs for poverty. The paper also investigates the effects of remittances, which have become important component of urban households' income over the last decade.

A poverty probability model is estimated using a dynamic probit model due to the presence of state dependence. There is a large amount of evidence in several countries (mainly OECD countries) that an individual or a household that is experiencing a poverty spell today is much more likely to experience it again in the future (Duncan et al., 1993; Oxley et al., 2000; Mejer and Linden, 2000; OECD, 2001; Giraldo et al., 2006, and Biewen, 2009).

Thus, to estimate the probability of being poor, a dynamic probit model is specified as:

$$p_{it}^* = \gamma p_{it-1} + x_{it}'\beta + \alpha_i + u_{it} \quad (1)$$

($i = 1, \dots, N; t = 2, \dots, T$), where p_{it}^* is a latent dependent variable; p_{it} is the observed binary outcome variable defined as

$$p_{it} = \begin{cases} 1 & \text{if } p_{it}^* > 0; \\ 0, & \text{otherwise.} \end{cases} \quad (2)$$

x_{it} represents a vector of explanatory variables; α_i is a term capturing unobserved household heterogeneity; and u_{it} is a normally distributed error term with mean zero and variance normalized to one. The subscripts i and t refer to households and time periods respectively. It is assumed that N is large but T is small, which implies that asymptotics depend on N alone.

In this empirical exercise, we'll replicate the results in Alem (2011) and practice estimating the alternative non-linear static and dynamic probit models for the probability of being poor in urban Ethiopia.

Questions

1. Present descriptive statistics of variables over time, and percentage of households based on poverty status for the analyzed period.
2. Are there striking differences in socio-economic variables of households based on poverty status?.

3. Estimate a pooled probit model for the probability of poverty, compute the corresponding marginal effects and comment on the results.
4. Declare the data as panel and estimate a static random effects probit model. Compute the marginal effects and interpret the results.
5. Estimate a static poverty probability model using the fixed effects logit model. Do you see any problem in using this estimator to model probability in urban Ethiopia?
6. Create the lagged dependent variable and estimate the poverty probability model using the standard Random Effects Probit model and comment on the magnitude of the state dependence coefficient. Do you see any problem with this estimator in estimating dynamic models like the one specified above? Discuss.
7. Explain how the Heckman estimator works for this kinds of models and implement the estimator using the "redprob" command.
8. One other model suggested to estimate such kinds of models is Orme's Two-step estimator. Explain how this estimator works and implement it for the probability of poverty model in urban Ethiopia.
9. Estimate the dynamic probit model using Wooldridge's Conditional Maximum Likelihood Estimator and discuss your results. How do the estimates from the different dynamic probit models compare?.
10. Do you find the role of other household members labor market status as significant correlates of poverty?.
11. What other serious econometric issue(s) are not addressed in the models estimated above?.
12. Based on the findings from the different estimators, it is safe to conclude that international remittances reduce poverty significantly! Do you agree? Explain.