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A tale of two measurements**

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# **The persistence of urban poverty in Ethiopia:** *A tale of two measurements*

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**Abstract:** This paper investigates dynamics of poverty in urban Ethiopia using both subjective and objective definitions of poverty. The two sets of estimates of persistence and recurrence of poverty are similar, suggesting that consumption-based mobility estimates are not seriously distorted by measurement error.

**Keywords:** Subjective poverty, poverty spells, state dependence.

**JEL-Codes:** I132

## **1. Introduction**

This paper provides evidence on the persistence of poverty in Ethiopia based on a panel data set that covers a decade using subjective and objective definitions of poverty. First, it provides a test of the robustness of consumption/income-based analysis of poverty dynamics. There is a concern that measurement errors in consumption/income lead to overestimates of true transitions across the poverty-threshold (e.g. Lillard and Wallis, 1978; McGarry, 1993; Rendtel et al, 1998; Breen and Moisiu, 2004; Glewwe, 2005). Availability of self-reported poverty in our data provides a rare opportunity to validate the consumption-based measures of poverty (Dercon and Krishnan, 2000; Breen and Moisiu, 2004). Secondly, the self-reported poverty status encompass other dimensions of deprivation with a potential to affect mobility but which are not captured by consumption/income based poverty estimates including asset ownership, health status, earning prospects, social capital, and relative deprivation (e.g. Hagerty, 2002). The next section provides a description of the methods used to analyze poverty persistence and the data source; section 3 discusses the key findings and section 4 concludes the paper.

## **2. Methodology and data description**

To analyze poverty persistence, we use the spells approach where estimates of exit rates following a spell in poverty, and alternatively estimates of re-entry rates following a spell out of poverty are computed using the non-parametric method

proposed by Kaplan and Meier (1956).<sup>1</sup> To establish the degree of “true” state dependence we specify a general model of poverty as follows:

$$P_{it} = \phi(P_{it-1}, X_{it}, \alpha_i) \quad (1)$$

where  $P_{it}$  is equal to 1 if the  $i^{\text{th}}$  household is poor at time  $t$  and zero otherwise. The vector  $X_{it}$  captures covariates of poverty and  $\alpha_i$  controls for the unobserved household characteristics that predispose some more than others to remain permanently in poverty. True state dependence in poverty dynamics exists if current poverty is significantly correlated with lagged poverty. The empirical model used here is a dynamic random-effects probit model that controls for unobserved heterogeneity and serial correlation and it is estimated using Maximum Simulated Likelihood method.<sup>2</sup>

The panel data used in this study was collected by the Department of Economics, Addis Ababa University in collaboration with Department of Economics, Gothenburg University during the period 1994-2004 in five waves. It started with 1500 households selected from seven major towns, including the capital, Addis Ababa, using stratified sampling technique. The balanced panel used in this study consists of close to 1000 households (see Bigsten and Shimeles, forthcoming, for details). Subjective poverty is

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<sup>1</sup> See Bane and Ellwood (1986), Stevens (1999), Devicienti (2003) and Bigsten and Shimeles (forthcoming) for a detailed discussion of exit and re-entry rates. These estimates are consistent and efficient (Wooldridge, 2002)

<sup>2</sup> For recent applications see Biewen (2004) and Cappilari and Jenkins (2004). (Chay and Hyslop, 1998) discuss how to address the problem of endogeneity of initial conditions in this model. Stewart (2006) provides a STATA program to estimate dynamic random effects model with auto-correlated error component used in this study.

computed based on responses given by the heads of households, who were asked to rank their welfare status on a scale with four steps from very rich to poor in each wave. Consumption based poverty is computed on the basis of a national poverty line constructed using the Cost of Basic Needs Approach (Ravallion and Bidani, 1994). Poverty lines computed in each wave for each town were used as price deflators to adjust consumption expenditure for price changes spatially and temporally.

### **3. Results**

Table 1a reports trends in the headcount ratio for urban Ethiopia during 1994-2004 based on three measures: subjective poverty, consumption-based poverty and the percentage of households poor in both measures.

<<Table 1>>

The cross-sectional poverty trends vary across the three definitions of poverty. Subjective poverty as reported by households spans a wide range of true inadequacies as well as self-effacing perceptions borne out of culture and tradition, and relative positions in society. Consumption-based measures however are narrower, focusing on hunger and deprivation. Households that are graded as poor by both accounts might be considered to be chronically poor.<sup>3</sup>

Despite differences in the aggregate estimates, we observe a strong monotonic relationship between consumption-based and subjective measures of poverty (Figure 1). At the household level, our evidence also suggests that 80% of households, who

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<sup>3</sup> Chronic poverty computed from the panel is around 24%.

considered themselves non-poor by the subjective poverty, were also non-poor by the objective measure and 72% of those that were poor by the objective measure also self-reported to be poor.

<<Figure 1>>

This strong correlation between the estimates may not be surprising (Ravallion and Lokshin, 2005). A more striking result is that the patterns of probabilities of escaping poverty or falling back into poverty were very similar for all three measures. We find comparable exit and re-entry rates and declining probabilities of either exit or re-entry rates with their respective spells (poverty or non-poverty spell) across the three definitions of poverty with little evidence of overestimating poverty transitions based on observed consumption expenditure.

<<Table 2>>

The result based on the dynamic random-effects probit model also indicates that true state dependence plays an important role in all definitions with the model that controls for serial correlation performing better. Controlling for unobserved heterogeneity and serially correlated random shocks led to relatively higher persistence of poverty in urban Ethiopia regardless of the measure of poverty one adopts.

#### **4. Conclusion**

We have shown that in the case of urban Ethiopia subjective and objective measures of poverty lead to comparable estimates of poverty transition and recurrence. This suggests that results from consumption-based poverty estimates of poverty dynamics are more robust than previous studies have suggested

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**Table 1: Trends in poverty based on objective and subjective measures in urban Ethiopia**

	1994	1995	1997	2000	2004
Subjective measure of headcount	53	56	53	49	47
Consumption based headcount	33	32	27	38	37
Headcount by both subjective and objective measures	24	24	20	26	24

**Table 2: Urban survival function, poverty exit and re-entry rates using the Kaplan-Meier estimator**

	Consumption based absolute poverty		Subjective poverty		Poor both by consumption and subjective measures	
Number of waves since start of poverty spell	Survivor's function	Exit rates	Survivor's function	Exit rates	Survivor function	Exit rates
1	1 (.)	. (.)	1 (.)	. (.)	1 (.)	. (.)
2	0.5589 (0.0239)	0.4411 (0.0319)	0.4827 (0.0269)	0.5173 (0.0387)	0.503 (0.0276)	0.497 (0.0389)
3	0.4263 (0.0263)	0.2372 (0.039)	0.4071 (0.0279)	0.1565 (0.0369)	0.3796 (0.0293)	0.2455 (0.0472)
4	0.3654 (0.031)	0.1429 (0.054)	0.3654 (0.0319)	0.1026 (0.0513)	0.3203 (0.0347)	0.1563 (0.0699)
Number of waves since start of non-poverty spell	Survivor function	Re-entry rate	Survivor function	Re-entry rate	Survivor function	Re-entry rates
1	1 (.)	. (.)	1 (.)	. (.)	1 (.)	. (.)
2	0.6685 (0.0244)	0.3315 (0.0299)	0.5597 (0.0248)	0.4403 (0.0331)	0.7023 (0.026)	0.2977 (0.031)
3	0.4652 (0.0290)	0.3041 (0.0422)	0.5104 (0.0258)	0.0881 (0.0235)	0.5574 (0.0305)	0.2062 (0.0359)
4	0.3757 (0.0313)	0.1923 (0.0497)	0.4865 (0.0281)	0.0469 (0.0271)	0.519 (0.0322)	0.069 (0.0282)

Source: Authors' computations, Terms in brackets are standard errors and all are significant at 1% or 5% level of significance.

**Table 3: A random effects dynamic probit model of poverty for urban Ethiopia using alternative definitions and methods of estimation**

	Consumption-based poverty			Subjective poverty			“Extreme poverty”		
	RE probit (IC exogenous)	RE probit (IC endogenous)	RE probit with serial correlation (IC endogenous)	RE probit (IC exogenous)	RE probit (IC endogenous)	RE probit with serial correlation (IC endogenous)	RE probit (IC exogenous)	RE probit (IC endogenous)	RE probit with serial correlation (IC endogenous)
Lag poverty	0.693 (0.000)***	0.372 (0.000)***	1.31 (0.000)***	0.654 (0.000)***	-.039 (0.669)	1.607 (0.000)***	0.800 (0.000)***	0.4822 (0.000)***	1.414 (0.000)***
Sex of head is female	-.139 (0.020)**	0.028 (0.727)	-.107 (.048)**	0.001 (0.986)	.009 (0.911)	-.0078 (0.867)	-.020 (0.793)	-.081 (0.349)	-.0792 (0.358)
Age of head	-.003 (.127)	-.007 (0.017)**	-.003 (0.114)	-.006 (0.003)**	-.007 (.021)**	-.0033 (0.040)**	-.006 (0.015)**	-.005 (0.088)*	-.005 (0.087)*
Head completed primary	-.313 (0.000)***	-.330 (0.000)***	-.227 (0.000)***	-.253 (0.000)***	-.386 (0.000)***	-.143 (0.005)***	-.355 (0.000)***	-.378 (0.000)***	-.370 (0.000)***
Wife completed primary	-.238 (.002)***	-.532 (0.000)***	-.176 (.013)**	-.294 (0.000)***	-.591 (0.000)***	-.174 (0.005)***	-.365 (0.000)***	-.473 (0.000)***	-.466 (0.000)***
Head is in private business	-.6868 (0.011)**	-1.70 (0.000)***	-.407 (.086)*	-1.303 (0.000)***	-1.84 (0.000)***	-.990 (0.000)***	-1.037 (0.003)***	-.771 (0.090)*	-.756 (0.095)*
Head is self-employed	-.063 (0.420)	-0.155 (0.138)	-.015 (0.825)	-.212 (0.007)***	-.181 (.095)*	-.118 (0.060)*	-.291 (0.003)***	-.179 (0.117)	-1.77 (0.120)
Head is civil servant	-.282 (0.001)***	-.162 (0.125)	-.237 (.002)***	-.117 (0.139)	-.191 (.080)*	-.060 (0.332)	-.437 (0.000)***	-.422 (0.001)***	-.416 (0.001)***
Head is private sector employee	-0.195 (0.133)	-.029 (0.852)	-.002 (0.987)	0.135 (0.92)	0.021 (0.900)	0.078 (0.434)	-0.04 (0.757)	0.052 (0.753)	0.039 (0.754)
Head is public sector employee	-0.222 (0.075)*	-.114 (0.450)	-.057 (0.643)	0.09 (0.69)	0.110 (0.75)	0.117 (0.180)	-0.23 (0.097)*	-0.17 (0.297)	-0.107 (0.388)
Head is casual labourer	0.261 (0.019)**	0.209 (0.114)	0.174 (0.115)	0.394 (0.004)***	0.454 (0.004)***	0.242 (0.01)**	0.223 (0.057)*	0.172 (0.212)	0.147 (0.158)
Number of observations	4650	4650	4650	4650	4650	4650	4650	4650	4650
Log likelihood	-1953	-1918	-1875	-2035	-1927	-1873	-1933	-1605	-1589

Note: IC-Initial Condition; regression controlled for period dummies; Variables used for initial condition include household size, education of head, ethnic and family background of head. \*\*\* Significant at 1%; \*\* significant at 5% and \* significant at 10%

Figure 1: Subjective poverty and consumption expenditure

