Poverty Transitions and Persistence in Ethiopia

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Abstract

Based on a rural and urban data set from Ethiopia, exiting from or re-entering poverty were found to depend on the time spent in or out of poverty. In comparison to urban areas, exiting rural poverty was easier than re-entering it. However, exiting poverty was extremely difficult the longer households were in that state, even more in urban than rural areas. In addition, the average time spent in poverty following a poverty spell is quite long for a typical household. Time-varying and other household characteristics were examined in the context of exiting and re-entering into poverty. Features of chronic poverty and vulnerability were also analyzed and the policy implications discussed.

1. Introduction

Frequently used aggregate measures of poverty such as the headcount ratio, do not account for past experiences of poverty. Some might have already spent many years in persistent poverty, others might have just fallen into poverty, and still others might have just escaped poverty but have a high probability of falling back in. The fist category represent the chronically poor, the second (hopefully) the transient poor and the third the vulnerable. The distinction of these features of poverty, along with the time-varying and individual-specific determinants is very important for policy purposes.

Recent literature on the dynamics of poverty focuses on the mobility across a given income threshold or poverty line, and attempts to distinguish chronic from transient poverty[1]. A household's consumption level at a specific time depends on its assets, and its ability to smooth consumption. If the household is credit constrained it may find it hard to cope with negative shocks. Chronic poverty can thus depend not only on current income but also on the household's lack of assets or its limited ability to translate assets into incomes. Incomes change over time by asset accumulation, changes in returns driven by savings behaviour or exogenous shocks.[2] Household income depends on the gender, education and other characteristics of its members, the changing size of the household due to fertility and migration decisions, as well as the state of the labour market. Part of the exercise in poverty dynamics is to investigate how these factors influence the persistence of poverty.

The dynamics of poverty has generally been assessed in two ways, the spells-approach focusing on transitions in and out of poverty, and the components approach, separating the chronic from transient component of poverty (Hulme, Shepherd, 2003, Jalan and Rvallion, 2000). To identify the chronic component of poverty, one can use average consumption over several periods (Rodgers and Rodgers, 1991). The spells approach is a powerful tool for understanding how the transient poor can emerge again from poverty if the analysis can clearly identify the factors that underlay their falling. But, to understand chronic poverty one needs to analyse social structures and mobility, or rather immobility, within them.

The discussion of transient poverty leads quite naturally to the discussion of vulnerability, which is not necessarily captured by current income estimates. What one would like to know is the extent to which households near the poverty line have assets that can serve as buffers against shocks. The shocks can be of several kinds, from droughts affecting agricultural output, to unemployment, illness or death of members of the household. Liquid assets (monetary assets or livestock, although in a general crisis the prices of livestock can collapse) can help protect households against these shocks. Households may also be able to incur debt, sell other assets than livestock, or pull children out of school. They may also draw on their social networks or in the end rely on support from government or other institutions.

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[1] See surveys in Baulch and Hoddinott (2000), Hulme and Shepherd (2003), McKay and Lawson (2003), and Yaqub (2003).

[2] Gunning et al (2000) have investigated the income dynamics in the resettlement areas of Zimbabwe. They had data on asset accumulation over time and combined this with estimates of changes in asset returns in an interesting analysis of a process of income convergence. There is little evidence in the literature on the cumulative income of shocks to households.

There have been few empirical studies on the dynamics of poverty. Bane and Ellwood (1986, p. 2-4) classified approaches to the study of poverty dynamics into tabulations of poverty over some fixed periods, methods using spell-durations and exit-probabilities and statistical methods which model the level of some variable such as income, allowing for complex lag error-structure.

McKay and Lawson (2003) reviewed the evidence on chronic and transient poverty noting that many studies had concluded that transient was more important than chronic poverty, though they themselves were sceptical. They belive that sometimes too stringent conditions had been imposed for a household to be classified as chronically poor, and also there were measurement errors that might explain why a household at some point in time seemed to escape from poverty. Yaqub (2003) reports evidence from 23 countries on factors that explain upward mobility, which was correlated with more land, and more education, while downward mobility was correlated with increased household size and the number of dependents. Dercon and Krishnan (2000) explored short-term vulnerability of rural households in Ethiopia finding that poverty rates were very similar over the 18 months over three surveys, although consumption variability and transition in and out of poverty were high.

This paper examines poverty persistence, chronic poverty and vulnerability using both the spells and components approach on a rich panel data set that covers approximately six years in four waves. To our knowledge such empirical work, notably one based on the spell approach, is rare for less-developed countries, and non-existence for Africa.

The next section outlines the methods used to capture poverty transitions, chronic poverty and vulnerability, section 3 describes the data and report exit and re-entry probabilities for various household types and separating the transient from the chronic components of poverty. Section 4 reports the determinants of chronic poverty and vulnerability and discusses the policy implications. Section 5 summarizes and draws conclusions.

2. Methodology

2.1. *Methods for analysing of poverty Spells and their determinants*

The common approach to analyze pverty spell (e.g. Bane and Ellwood, 1986, Stevens, 1995, 1996) is to compute the probabilities of exiting, and re-entering poverty given certain states and other characteristics of households, using either non-parametric and parametric methods. The probabilities can be considered as random variables with known distributions (see Antolin et al, 1999).

Non-parametric methods are quite powerful in estimating how the probabilities of exiting or re-entering poverty are affected by spell-durations. Exit rates relate to a cohort of households that have just become poor and are "at risk of" exit thereafter. Similarly, re-entry rates refer to cohort of households newly out of poverty and "at risk" of re-entering poverty (see e.g. Bane and Ellwood, 1986, Stevens, 1999 and Devicienti, 2003 for detail discussion of exit and re-entry rates). Given this definition, the observations relevant for estimating the exit and re-entry rates are spells that occur in wave 2 due to the exclusion of left-censored observations.

Similarly, re-entry into poverty refers to a situation where a household is at risk of entering into poverty after a spell of being out of poverty[3]. We used the non-parametric Kaplan-Meier method to estimate the probability of new-poor surviving as poor or of newly non-poor surviving as non-poor. The survivor function S(t) is defined as the probability of survival past time *t* (or equivalently the probability of failing after *t*). Suppose our observation is generated within a discrete time interval t_1, ..t_k, then, the number of distinct failure times observed in the data (or the product limit estimate) is given by:

$$\hat{S}(t) = \prod_{j|t_j \leq t} \left(\frac{n_j - d_j}{n_j}\right) \quad (1)$$

Where n_j is the number of individuals at risk at time j, and d_j is the number of failures at time t_j. The product is overall observed failure times less than or equal to t..

[3] The exit rates refer to a cohort of households just falling into poverty and hence at risk of exit thereafter. Similarly, re-entry rates refer to cohort of households just starting a spell out of poverty and are at risk of re-entering into poverty (see e.g. Bane and Ellwood, 1986, Stevens, 1999 and Devicienti, 2003 for detail discussion of exit and re-entry rates). Given this definition, the observations relevant for estimating the exit and re-entry rates are spells that occur in wave 2 due to the exclusion of left-censored observations .

The parametric method on the other hand, models the distribution of spell durations via the probabilities of ending a spell.[4] Suppose we are interested in modelling the duration of poverty for household *i* which entered at t_0[5]. We can define a dummy $\delta_i=1$ to distinguish households which completed the spell (exited out of poverty) from those who continued in the poverty spell, $\delta_i=0$ at the end of the period (months, years or rounds in our case). The percentage which completed is the event-rate (or called "hazard rate" for that period and corresponds to a "survivor-rate" which indicates the percentage continuing in poverty at that point. Formally, a discrete-time hazard rate h_{it} can be defined as:

$$h_{i_t}(t) = pr(T_i = t / T_i \geq t;\ X_{it}) \tag{2}$$

where T_i is represents the time when poverty spell ended, X_{it} refers to a vector of household characteristics and other variables. The overall probability of ending a spell at $T_i=t$ is given by the product of the probabilities that the spell has not ended from t=t0 until *t-1* and that it has ended at time t. Similarly, the probability of ending the spell at $T_i>t$ is given by the joint probability poverty has not ended up to , that is, [6]

$$\begin{aligned} prob(T_i = t) &= h_{it}\prod_{k=1}^{t-1} 1 - h_{ik} \\ prob(T_i \succ t) &= \prod_{k=1}^{t}(1 - h_{ik}) \end{aligned} \tag{3}$$

There are two frequently used ways to specifying the distribution of the hazard rate. One is with a the proportional hazard model given by:

$$h(t \mid x_{ij}) = h_0 \exp(x_{ij}\beta_x) \tag{4}$$

where h_0 is the base line exit (or re-entry) rate and X_{ij} is the vector of variables believed to influence the hazard. It is possible to control for unobserved household heterogeneity[7] by adding a multiplicative random error[8] term into equation (4) so that the instantaneous hazard rate becomes:

$$h(t \mid x_j) = h_0\varepsilon_j \exp(x_j\beta_x) = h_0 \exp\left[X_j\beta + \log(\varepsilon_j)\right] \tag{5}$$

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[4] We draw heavily from Jenkins(1995) and Stevens(1999) to discuss the parametric approach to modeling exit and re-entry rates.

[5] The same analogy applies for re-entry. So we restrict the discussion to the modeling of exiting from poverty.

[6] See Jenkins(1995) for the details on the derivation of equation (2)

[7] Jenkins(2000) developed an algorithm that can be run in STATA to estimate a proportional hazard model with unobserved household heterogeneity and we report some of the results below.

[8] ε is a Gamma distributed random error term with unit mean and variance

The underlying log-likelihood function for equation (5) is a generalized linear model of the binomial family with complementary log-log link (Jenkins, 1995).

The other frequent way to specify the distribution the hazard rate is the logistic structure. For distribution function of duration, T, F(t)=prob(t<T), for t> 0 and the density function f(t)=dF/dt, the corresponding hazard or conditional probability is (see also above):

$$h_i(t) = pr(T_i = t / T_i \geq t;) = \frac{f(t)}{1 - F(t)} \tag{6}$$

If h_i follows a logistic structure, then:

$$h_i(t) = \frac{\exp(t)}{1 + \exp(t)} \tag{7}$$

Spell durations can again be expressed as a function of duration effects, α_{id}, and a set of variables, X which vary across spells and time. It includes individual characteristics and other factors that influence the flow of resources to the household or individual. Thus,

$$t_{idt} = \alpha_{id} + \beta X_{it} \tag{8}$$

where d indexes number of years in poverty. The probability of individual *i* exiting poverty in year t with a current duration in poverty of d years is given by the hazard function:

$$h_{idt} = \frac{\exp(\alpha_{id} + \beta X)}{1 + \exp(\alpha_{id} + \beta X)} \tag{9}$$

This can be estimated by maximising the relevant log-likelihood function for all observations.

2.2 Measuring Vulnerability and Chronic Poverty

Depending on the definitions of vulnerability, various measures have appeared in the recent literature (see e.g. Prichett et al 2000, Kamanou and Morduch 2002, Chaudri et al, 2002, Ligon and Schechter, 2003, Christianesen and Subbaro, 2004 and Calvo and Dercon, 2005).

Pritchett et al define vulnerability as the probability of being below the poverty line in an given year, that is

$$V_i = P(y_{it} < z) \tag{10}$$

where V_i is vulnerability, y_{it} is per capita consumption of household i in year t, and z is the poverty line. To estimate vulnerability we followed Pritchett et al (2000) and

McCulloch and Callandrino (2003) in estimating these probabilities[9]. We assumed that the distribution of consumption expenditures was normal, while its mean and variance were allowed to vary across households over time. We computed mean consumption expenditure y^*_i and its standard deviation, s_i for each household over the four survey waves. The probability of consumption being below the poverty line was then :

$$Vi = P\left(\frac{y_{it} - \mu_i}{\sigma_i} < \frac{z - y_i^*}{s_i} \right) \qquad (11)$$

That is the probability the standard normal variate y_{it} will fall below the poverty line normalised by subtracting mean consumption and diving by the standard deviation[10].

Chronic poverty has been measured in at least two ways in recent literature. Some (e.g. McCulloch and Calandrino 2003) take the number of times an individual has been in poverty to indicate the chronic nature of poverty, and others (Jalan and Ravallion, 2000 and Haddad and Ahmed, 2003) use expected income over a certain period as an indicator of chronic poverty.

This indicator decomposes poverty P_i , into transient component, T_i ,and a chronic component C_i, where each are defined over a stream of income, y_{it} for the i^{th} individual within D time period, as follows:

$$P_i = P(y_{i1,} y_{i2}, ... y_{iD}) \qquad (12)$$

$$C_i = P(Ey_{i1}, Ey_{i2}, ... Ey_{iD}) \qquad (13)$$

$$T_i = P_i - T_i \qquad (14)$$

We report both measures. We also compare measures of vulnerability with chronic poverty to get an idea of poverty-persistence.

3. Data and Variables

Data from 1500 rural and 1500 urban households was collected in 1994, 1995, 1997 and 2000 by the Department of Economics, Addis Ababa University, in collaboration with University of Oxford (rural) and Goteborg University (urban) covering household living-conditions including income, expenditure, demographics, health and education status, occupation, production-activities, asset-ownership and other variables.

[9] Hoddinnott and Quisumbing (2003) Ligon and Schechter (2004) review of the recent literature on measures of vulnerability.

[10] This measure can be considered a first-order approximation to vulnerability with a number of limitations. Among others, the use of standard deviation as a key indicator of vulnerability means that negative and positive shocks of equal magnitude are treated equally, which is variability not vulnerability per se. It also does not distinguish episodes of increasing consumption from an episode of cyclical consumption. Finally, different degrees of persistence are not distinguished (Kamanou and Morduch, 2002).

Stratified sampling was used to take into account agro-ecological diversities, and to include all the major towns. For poverty estimates, we computed consumption-expenditure per adult-equivalent (see Bigsten and Shimeles, 2005, for details). We used price data collected with the surveys to adjust for price differences over-time and location, converting values to 1994 prices[11].

Table 1 shows the distribution of rural and urban sample households by the number of times in poverty. Among the four survey-waves, only about 12% of households were poor every time, slightly more in the urban than in the rural sample. On the other hand, only 16% of the rural sample was never poor, compared to 32% of the urban sample. This may be due to more variability of incomes in rural areas than in urban areas because of the dependence of agricultural incomes on weather and fluctuating output prices. Alternatively the larger fluctuations in consumption in rural areas may be due to the lack of consumption smoothing possibilities.

It is interesting to note that the percentage of households consistently non-poor and poor are higher in urban areas than rural areas, indicating the fact that poverty is more chronic in urban areas than in rural areas[12].

[11] Price data was not collected for the 2000 urban survey. We used instead the price data collected by the Ethiopian Central Statistical Authority, which more or less was compatible with price data collected in previous waves.

[12] Transitions into and out of poverty is a concept that carries significant qualitative difference in welfare. To allow for this important distinction and also to reduce the effect of measurement errors in computing per capita consumption expenditure, we dropped all real per capita changes that fell within an interval of 20% of the poverty line.

Table 1: Percentage of Households by Poverty Status: 1994-2000

Poverty Status	Rural	Urban
Never poor	16	32
Once poor	24	21
Twice poor	25	18
Thrice poor	23	15
Four times poor	11	13

Tables 2a and 2b report descriptive statistics (means) for the rural and urban samples by the number of times in poverty. Rural households (Table 2a) were consistently poor more often as their size and age of the household-head increased, while they had less land and fewer oxen. Their crop-sales and asset-values were also generally less. It was also consistently less likely that the head and or the wife had completed primary school. With some anomalies, households poor more often were also more likely to have heads engaged in off-farm employment, but (perhaps less surprisingly) less likely to have female heads.

Table 2b: Descriptive Statistics for rural households by poverty status 1994-2000

Variable	Never Poor	Once Poor	Twice poor	Three times poor	Always poor
Household size (numbers)	4.9	5.8	6.4	6.9	8.3
Age of head of household (years)	44	46	47	47	48
Female headed households (%)	23	22	18	22	16
Household head with primary education. (%)	12	10	7	7	3
Wife completed primary school (%)	4	2	2	1	1
Land size (hectare)	1.1	0.9	.7	0.7	0.5
Crop sale (birr)	334	247	158	83	90
Asset value(birr)	225	173	152	87	92
Off-farm employment (%)	24	38	39	45	29
No of oxen owned	2	1.7	1.4	1.1	0.78

Source: authors' computation

Similarly, urban households (Table 2b) were consistently poor more often as their size and (with anomaly) the age of the household-head increased. It was also consistently less likely that the head and/or the wife had completed primary schools, and generally more likely that they lived in Addis Ababa. Those with any form of regular employment were generally less likely to be poor more often. Among those poor most often, the occupations (besides casual workers) most represented were own-account workers and civil servants.

Following the discussion above, in the rural as well as urban areas, the proximate correlates of household consumption expenditure used to estimate the parametric models are household demographics, like size and composition of the household, the level of human and physical capital, and proxies for exogenous shocks, such as rainfall and unemployment. Within this broad classification of the covariates of poverty transitions, for rural areas we identified total number of people in the household in each period, mean age of the household (to capture composition) as well as the sex of the head of the household.

In addition, the education of the wife, in contrast to the head (see also Bigsten and Shimeles, 2005) turns out to be an important factor in the status, and overall welfare

of rural households. Given that farming is the key source of livelihood in rural Ethiopia, we included dummies for different farming systems (cereal growing areas, cash-crop growing areas and *enset*-root crop- growing areas) in the hope of capturing the underlying differences in climate and farming methods. Further more, household physical assets were proxied by the total size of land owned and the number of oxen owned. We also included in the model exogenous factors such as access to markets and rain-fall shocks as possible factors affecting mobility into and out of poverty. We have used these variables in the context of both ending a spell of poverty and exiting it, and also ending a spell out of poverty and re-entering it. For households in urban areas, the variables determining exit or reentry into poverty are basic demographic indicators, occupational structure, and region of residence, exogenous shocks such as unemployment and to a certain extent the ethnic background of the head of the household.

4. Poverty-transitions and persistence.

4.1 Transition probabilities and "survival functions"

Table 3 shows transition-probabilities by poverty-status for the rural and urban sampled-households. Following the first survey, the possible transitions are either a household that had been poor could remain poor or become non-poor, or a household that had been non-poor could remain non-poor or become poor. The transition probabilities depend on the total number of households in the sample and distributions of households in or out of poverty. Of all the possible transitions, (regardless of the initial states) the probability of a household becoming poor in any one of the survey waves was 47%. Of those that started poor in the initial period, 47.8% remained poor, whereas those started non-poor 61.6% remained non-poor. So, there was substantial persistence of poverty and non-poverty. On the other hand, 38.3% of households who were initially non-poor became poor and 52.2% who had been poor became non-poor in subsequent rounds indicating substantial consumption variation and resulting upward and downward mobility.

Table 3: Transition Probabilities by Poverty Status: 1994-2000

Poverty Status	Poor	Non-Poor	Total
		Rural	
Poor	47.8	52.2	100
Non-Poor	38.3	61.6	100
Total	47.0	53.0	100
		Urban	
Poor	65.0	35.0	100
Non-Poor	23.4	76.6	100
Total	32.4	67.6	100

Source: authors' computations

Of all transition probabilities in the urban sample, fewer (32.4%) had "poor" outcome whereas 67.2% had "non-poor". However, in a higher percentage (65%) of cases where the household had been poor they remained poor, and in 76.6% of the cases where they had been non-poor they remained non-poor. So, in the urban sample, there was less upward and downward mobility, and greater persistence of both poverty and non-poverty.

From table 3 we also see that mobility in and out of poverty is much more extensive in the rural than urban areas. Rural households thus experience larger swings in consumption than urban households. Poverty in the urban economy is to a higher degree of a chronic character. The urban poor seem to have small chances of breaking out of poverty. Tables A1.1 and Tables A1.2 in the appendix give a finer breakdown of transition probabilities by decile, but the picture essentially is the same.

Tables 4a and 4b report poverty-exit and re-entry rates for rural and urban households using the Kaplan-Meier estimator (equation 1).

Table 4a: Rural survival function, poverty exit and re-entry rates using the Kaplan-Meier estimator

Number of rounds since start of poverty spell	Survivor's function	Exit Rates
1	1.000	.28
	(.)	(.05)
2	0.72	.15
	(.0404)	(.02)
3	0.33	-----
	(.033)	
Number of rounds since start of non-poverty spell		Re-Entry Rates
1	1.000	0.38
	(.)	(.047)
2	0.62	0.23
	(.037)	(.03)
3	0.32	-----
	(.03)	

Source: authors' computation-terms in brackets are standard errors.

For rural as well as urban areas, the longer they were in poverty, the harder it was to get out (lower exit rates over time) and the longer they were out of poverty the less likely they were to re-enter (low re-entry rates over time); in other words, duration dependence. Unlike the simple transition matrices reported in Tables 3(a) and 3(b), here the role of initial conditions and path dependence plays a significant role. Urban exit and re-entry rates were consistently lower than rural rates, confirming our earlier picture of more consumption variation and mobility both upward and downward in the rural sample, and more chronic poverty (and non-poverty) in the urban sample.

Table 4b: Urban survival Function, Poverty Exit and Re-entry Rates using the Kaplan-Meier estimator

Number of rounds since start of poverty spell	Survivor's function	Exit Rates
1	1.000	.22
	(.)	(.05)
2	0.78	.11
	(.06)	(.03)
3	0.39	……
	(.04)	
		Re-Entry Rates
1	1.000	0.31
	(.)	(0.05)
2	0.69	0.14
	(.0405)	(.02)
3	0.3726	--------
	(.03)	

Source: authors' computation-terms in brackets are standard errors.

Whereas the exit-rates reported on Table 4 summarized information (at least in the first row) for cohorts that could have begun poverty-spells in either 1995 or 1997, Table 5 (below) reports rural and urban "hazard" rates only for the cohort that was first poor in 1995. Of them, 53.4% (rural) and 58.1% (urban) remained in poverty only for round, and were recorded as non-poor in the 1997 survey. Their exit rates are much higher than those on the first rows of Table 4. It is also shown that the percentage of households with longer spells[13] declined significantly in subsequent rounds. For such households, the "mean round" spent in poverty is approximately 1.6 for rural and 1.5 for urban areas, or taking into account the 6 years spanning the rounds, the "mean years" spent in poverty are approximately 3.5 and 3.25 years for rural and urban households, respectively.

Table 5: Distribution of the 'number of rounds in poverty out of three rounds' for households starting a poverty spell in round 2.

Number of rounds in poverty	Hazard rates	
	Rural	**Urban**
1	53.45	58.06
2	33.05	29.44
3	13.5	12.5
	100	100
Mean number of rounds in poverty ("mean years")	1.6 (3.5)	1.54 (3.25)

Source: authors' computation.

This suggests that transiting out of a spell of poverty on the average takes longer time once a household fell into poverty.

4.2. Correlates of poverty-exit and re-entry

[13] The shortness of the panel does not allow us to look into multiple spells. In our definition of exit and re-entry, a typical household can be observed completing one spell and just starting another one. So, the issue of multiple spell cannot arise.

We estimated both the logistic and proportional hazard models to compare these models in controlling for unobserved household heterogeneity. In their simpler form, the hazard models assume that spells in two alternating states for the same individual are uncorrelated. As a result, the spells in poverty and out of poverty can be estimated separately for the same individual. This can be true in the absence of unobserved household attributes and characteristics that may pre-dispose some more than others to be in one state than another (see e.g. Devicienti, 2001). The simple hazards functions consider each spell uncorrelated. In our case, the shortness of the panel does not allow for multiple spell specially if the observations at the beginning of the survey are not considered (are left-censored), thus, we use a random-effects version of the logistics model as well as the proportional hazard model with and without unobserved household heterogeneity.

We address the issue of unobserved individual heterogeneity within the proportional hazard model using Jenkin's (2000) specification of multiplicative error term capturing each individual household's unobserved characteristics and additive random error term specific to each household in the logistics set up. We report in Tables 6-10 estimates of the random-effects logistic hazard model (Model1), the proportional hazard model without unobserved household heterogeneity (Model 2), and the same model that incorporates unobserved household heterogeneity (Model 3)[14].

Table (6) reports coefficients (and corresponding p-values) for exiting poverty. In all three specifications, the duration of the spell of poverty itself had a highly significant negative effect, as did household size and rain variability. This negative dependency on the duration of poverty spell is a common feature observed in similar studies (for example, Devicienti, 2003 for UK and Hansen and Wahlberg, 2004 for Sweden). The larger the size of the household, for a given amount of consumption capability, the lower will be the per capita consumption and the higher the chance of staying in poverty. The literature on population dynamics generally assumes that a household chooses over a life cycle the optimal household size so that household size is a choice variable where the estimated coefficients could be a result of reverse causation (from household size to consumption) or could be driven by the unobserved element in the model. Anand and Morduch (1996) argue that the negative correlation commonly reported in poverty studies between consumption and household size implies that a household deliberately exacerbates its own poverty by increasing the size of its members. As reported in Bigsten and Shimeles (2005), the effect of household size could be positive if the scale-effect is taken into account by using say a quadratic term in regression models, as also contended by Anand and Morduch (1996). However, for a household size close to the mean, the result that household size is bad for poverty is robust regardless of the fact that demographic choices may be good for the family in the long term.

Producing enset also had highly significant negative effects in the first two models, though far from significant when heterogeneity was controlled for in the proportional hazard model. The mean age of the household had conventionally (or close) negative effects. Asset value, land-size and number of oxen owned all had significant (or close) positive effects as did change in rain volume. Producing cash crops (coffee or chat)

[14] The formal specifications of these models is presented in section 2.

gave significant and mostly positive effects, with large differences between the two proportional hazard models, however. Producing teff also had a significant and positive effect in the last model.

Table 6: Covariates of exiting poverty spell in rural areas

Variables	Model 1		Model 2		Model 3	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Log of duration	-6.08	.000	-4.912	0.000	-4.83	.000
Demographic						
Household size	-.21	.000	-.128	.000	-.48	.001
Sex of the head	-.06	.751	-.052	.644	-.29	.560
Mean age of the hh	-.009	.144	-.0045	.228	-.032	.070
Education of the wife	.029	.939	.035	.869	1.4	.204
Farming Systems						
Teff	-.11	.56	-.088	.433	1.05	.041
Coffee	.46	.131	.386	.068	2.67	.033
Chat	.76	.002	.478	.003	-1.4	.167
Enset	-.56	.060	-.4453	.027	-.96	.745
Wealth variable						
Asset value	.0009	.011	.0003	.116	.0003	.051
Land size	.128	.012	.0662	.019	.141	.375
Number of oxen owned	.1099	.147	.085	.040	.46	.015
Infrastructure						
Access to market	.00006	.018	.00003	.031	.0002	.033
Exogenous shock						
Rain variability	-.032	.0000	-.019	.000	-.03	.084
Change in volume of rain	.0074	.000	.0023	.267	-.04	.002

With respect to re-entering into poverty, while most variables tend to show expected signs (see Table 7), they have however less statistical significant as compared to the case of exiting from poverty. Household size, farming systems, land ownership, rainfall availability seem to do well in most cases in determining the hazard of re-entering into poverty. The time spent out of poverty is negatively related with the probability of re-entering into poverty (or the time spent in poverty is positively related with the probability of re-entering into poverty).

Table 7: Covariates of re-entering into poverty for rural areas

Variables	**Model 1**		**Model 2**		**Model 3**	
	Coeffice	P-value	Coeffi	P-value	Coeff	P-value
Log of duration	2.809	.000	1.83	.000	**1.13**	**.000**
Demographic						
Household size	**.214**	**.000**	**.12**	**.000**	**.206**	**.007**
Sex of the head	-.159	.459	-.14	.364	-.24	.451
Mean age of the hh	.0029	.721	-.0003	.996	-.001	.917
Education of the wife	-1.37	.142	-.93	.201	-2.35	.143
Farming Systems						
Teff	**-.386**	**.063**	-.20	.164	-.555	.249
Coffee	**-.759**	**.088**	**-.45**	**.095**	**1.17**	**.085**
Chat	-.881	.149	-.61	.106	-.53	.539
Enset	**.755**	**.008**	**.38**	**.047**	-1.22	.994
Wealth variable						

Asset value	-.00061	.221	-.0004	.329	**-.01**	**.001**
Land size	-.228	.000	-.2	.164	-.145	.139
Number of oxen owned	.1106	.274	.05	.461	.20	.168
Infrastructure						
Access to market	-.00004	.221	-.00002	.406	.00002	.645
Exogenous shock						
Rain variability	**.0014**	**.612**	**.03**	**.000**	**.06**	**.001**
Change in volume of rain	**-.046**	**.000**	**.001**	**.559**	**-.05**	.319

For households in urban areas, Table 8 reports that again the duation of the spell in poverty had a highly significant negative effect on the chance of getting out it, as did household size, where as "head completed primary school had a highly significant and positive effect in the first two models, thogh much less significant in the third. Some other occupations also had significantly postitve effects in the first wo models though not as larage effects as private buysiness. In the third model, casual worker had a highly significant and failry large positive effect. Redisdence in Addis, Dire Dawa and Mekele also had significant and positive effects in some models with especially large coefficients in the third model.

Table8: Covariates of exiting poverty spell for urban households

Variables	Model 1		Model 2		Model 3	
	Coeffice	P-value	Coeffi	P-value	Coeff	P-val
Log of duration	**-2.232**	**.000**	**-1.597**	**.0000**	**-1.69**	**.000**
Basic demographic variables						
House hold size	**-.24**	**.000**	**-.09**	**.000**	**-.2**	**.000**
Sex of the head of the household (male reference)	-.192	.408	.05	.37	-.1	.724
Age of the head of the household	**.005**	**.501**	**.008**	**.151**	.01	.188
Mean age of the household	.011	.408	.003	.701	.002	.19
Education of the head of the household	**1.25**	**.000**	**.6**	**.000**	**.56**	**.023**
Education of the wife	.394	.118	.023	.15	-.07	.820
Dummies for the occupation of the head of the household						
Private business	**2.28**	**.003**	**1.4**	**.002**	.99	.231
Own account worker	.61	.02	.31	.072	.45	.231
Civil servant	.66	.042	.47	.016	.23	.577
Public sector employee	.007	0983	.04	.19	-.29	.634
Private sector employee	.741	.088	.5	.054	.61	.222
Casual labourer	-.04	.937	.15	.6	1.2	.011
Region of residence (town)						
Addis Ababa	.69	.098	.58	.027	9.08	.000
Awasa	.05	.937	-.009	.978	-4.9	.993
Bahir Dar	.04	.943	.21	.72	8.5	.000
Dessie	-.19	-.768	-.0007	.999	7.6	.000
Dire Dawa	.79	.119	.85	.010	9.0	.000
Mekele*	.83	.209	.92	.022	19.8	.000
Exogenous shocks						
Unemployed	-.70	.090	-.4	.21	-.29	-.49
Ethnic Background						
Amhara	.197	.593	.199	.79	.11	.445

Oromo	.17	.676	-.08	.6	.27	.441
Tigrawi	.46	.391	-.14	.6	-9.8	.042
Gurage	-.004	.993	.2	.295	.28	.485

* Jimma is the reference town

As might be expected, being unemployed and casual labourer are occupational categories for which exiting out of poverty is difficult and also vulnerable to re-enter poverty. Ethnic background seems to play little if at all role in affecting poverty mobility.

Table 9 reports results for re-entering urban poverty , which are similar though again with less significance. Head completed primary school again had highly significant negative effects (on reentering poverty) in all three specifications. None of the other results are nearly so clear and consistent.

Table9: Covariates for re-entering poverty spell for urban households

Variables	Model 1		Model 2		Model 3	
	Coeffice	P-value	Coeffi	P-value	Coeff	P-val
Log of duration	.21	.41	-.14	.125	9.9	.000
Basic demographic variables						
House hold size	.175	.008	.08	.000	.008	.228
Sex of the head of the household (male reference)	-.027	.937	-.011	.117	-.09	.715
Age of the head of the household	-.011	.441	.002	.655	.002	.92
Mean age of the household	-.012	.441	-.01	.166	-.009	.631
Education of the head of the household	-.886	.014	-.46	.000	-.19	.4
Education of the wife	-.29	.536	-.19	.194	.65	.022
Dummies for the occupation of the head of the household						
Private business	-1.73	.197	-.68	.089	-.45	.704
Own account worker	-1.01	.051	-.19	.169	-.177	.579
Civil servant	.19	.684	-.18	.252	.16	.703
Public sector employee	.42	.625	.52	.015	-.22	.645
Private sector employee	-.04	.951	.19	.395	-.113	.805
Casual labourer	1.56	.006	.309	.03	-.23	.526
Region of residence (town)						
Addis Ababa*	-1.66	.006	-.43	.011	.76	.182
Awasa	-.79	.361	-.11	.646	1.2	.082
Bahir Dar	-1.9	.088	-.49	.139	1.06	.206
Dessie	1.29	.244	.381	.184	.67	.389
Dire Dawa	-1.23	.276	-.27	.349	.81	.239
Mekele	-1.5	.159	-.07	.845	-1.08	.138
Exogenous shocks						
Unemployed	.78	.335	.49	.007	-.009	.98
Ethnic Background						
Amhara	-.75	.178	-.13	.204	-.52	.35
Oromo	-.45	.443	-.05	.643	-.38	.29
Tigrawi	-.76	.353	-.76	.01	-.52	.35
Gurage	.03	.967	-.25	.36	-.09	.793

* Jimma is the reference town

4. "Vulnerability", Chronic Poverty and Their Determinants

Tables 10 and 11 repoort rural and urban "vulnerability" (equation (11) by mean (1994-2000) consumption expenditure-decile and by poverty status. At the high end (the upper six deciles, Table 10), rural households were more vulnerable than urban ones, perhaps reflecting rural susceptibility to weather and price-shocks, versus more secure urban occupatiosn. At the low end, however, rural households were less vulnerable than urban, perhaps reflecting their greater ability to subsist on land.

Table 10 Vulnerability by Inter-temporal Consumption Expenditure Decile

Inter-temporal mean consumption decile	Urban households	Rural households
1	0.99	0.98
2	0.89	0.83
3	0.72	0.64
4	0.46	0.43
5	0.26	0.30
6	0.18	0.22
7	0.14	0.18
8	0.12	0.17
9	0.09	0.16
10	0.07	0.15

When viewed by the number of times in poverty (Table 12), the rural-urban differences are not so striking, but, the general pattern is clear: very high vulnerability among those most consistently poor, and about 10% probability even among those "never poor".

Table 11: "vulnerability" by the status of poverty

Poverty status	**Rural Households**	**Urban Households**
Never poor	.10	.09
Once poor	.25	.24
Twice poor	.44	.41
Three times poor	.65	.68
Always poor	.97	.96

Source: authors' computation

In both rural and urban samples, household size had a signicante effect increasing vulnerability, as did age of the household-head and especially the dependency ratio, while head or wife having completed primary school reduced it (more so in the urban sample). Female headed households had small but statistically significant effects indicating higher rural but lower urban vulnerability.

In the rural areas, land-size and the number o foxen owned as well as growing coffee or chate reduced vulnerability as did change in rainfall, while rainfall-variability increased it. Off-farm employment was also significantly correlated with higher vulnerability.

In the urban areas, all occupations except causal worker and unepoloyed reduced vulnerability (all but one at conventionally significant levels)., with private-business employer having by far the largest effect, followed by private-sector employee. Bein g a causal worker, or unemployed increased vulnerability. Residence in Addis or Dessie increased vulnerability, while residence in Bahirdar reduced it. Relative to Other ethnic groups in Ethiopia, all the major ethnic groups had reduced vulnerability, with Tigrawi the strongerst effect.

Tab 13a: Determinants of Vulnerability in Rural Ethiopia:1994-2000

Explanatory variables	A measure of 'vulnerability
household sze	0.02
	(11.65)**
Farming systems	-0.185
	(12.47)**
female headed households	0.036
	(3.02)**
has the household head completed primary school?	-0.059
	(3.25)**
has the wife completed primary school?	-0.032
	-0.93
total land of household in hectares	-0.021
	(7.74)**
mean age of the household	-0.006
	(2.99)**
age of household head	0.003
	(2.05)*
population of nearest town divided by the distance in kms from the site	0
	(10.34)**
meanage2	0
	-0.4
Agehhh2	0
	-0.24
dependency ratio	0.121
	(3.48)**
worked on someone else land or other employment?	0.046
	(4.58)**
Dummy for households which harvested teff during last season	0.007
	-0.68
Dummy for households which harvested coffees last season	-0.126
	(7.19)**
Dummy for household which harvested chat last season	-0.199

	(10.98)**
Dummy for enset sites	0
	(.)
Number oxen owned (bulls, oxen and young bulls)	-0.018
	(4.66)**
difference in rainfall level	-0.001
	(3.91)**
Variability in rainfall level	0.005
	(16.33)**
Constant	0.811
	(13.41)**
Observations	2423
R-squared	0.4
Absolute value of t statistics in parentheses	
* significant at 5%; ** significant at 1%	

Table 13b: Determinants of Vulnerability in Urban Ethiopia

	Dependent variable (Measure of vulnerability)
Household size	0.02
	(8.17)**
mean age of household members	-0.004
	-1.48
Dummy for female headed households	-0.03
	(2.19)*
age of household head	0.007
	(3.86)**
dummy for household with at least primary education	-0.151
	(11.00)**
dummy for wife with at least primary education	-0.14
	(9.51)**
household head private business employer	-0.259
	(6.16)**
household head own account worker	-0.099
	(6.01)**
household head civil servant	-0.063
	(3.43)**
household head public enterprise worker	-0.027
	-1.24
household head private sector employee	-0.126
	(4.54)**
household head casual worker	0.09
	(3.90)**
household head unemployed	0.086
	(3.33)**
dependency ratio (<15+>65)/hhsz	0.294
	(9.29)**
household mean age squared	0
	-0.28
age of household head squared	0
	(3.78)**

addis	0.064
	(2.66)**
awasa	0.019
	-0.59
bahrdar	-0.069
	(2.28)*
dessie	0.107
	(2.90)**
diredawa	-0.003
	-0.09
mekele	-0.019
	-0.49
amhara	-0.092
	(4.55)**
oromo	-0.075
	(3.45)**
tigrawi	-0.2
	(6.67)**
gurage	-0.05
	(2.13)*
harari	-0.18
	-1.93
Constant	0.342
	(3.65)**
Observations	2769
R-squared	0.3

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

To complement our analysis of vulnerability to poverty we also run a logistic regression of chronic poverty against the usual covariates. Table 14 and Table 15 report the marginal effects and corroborate the results with regard to a measure of vulnerability. In some sense, it does not matter whether one uses a measure of vulnerability of chronic poverty for the profile of poverty or discussing its determinants in this case.

From Table (14) we note the strong response of chronic poverty with regard to farming systems, particularly for *chat* growers, and household demographics like size and composition. Notably, we see that education reduces chronic poverty significantly in rural areas. We also note that market access significantly reduces chronic poverty. Interestingly we note that off-farm activity is associated with higher chronic poverty. This suggests that off-farm income activity is a survival strategy and not a sign of a household moving up the income scale. The production of chat again is a very reliable way out of poverty.

Table 14: Marginal Effects of Logit estimate for the determinants of Chronic Poverty in rural Ethiopia: 1994-2000

Explanatory variables	Chronically poor
household sze	0.168
	(8.42)**
farming systems	-1.026
	(6.62)**
female headed households	0.185
	-1.43
has the household head completed primary school?	-0.277
	-1.34
has the wife completed primary school?	-0.003
	-0.01
total land of household in hectares	-0.198
	(5.91)**
mean age of the household	-0.061
	(2.36)*
age of household head	0.034
	-1.8
population of nearest town divided by the distance in kms from the site	0
	(9.14)**
meanage2	0
	-0.17
agehhh2	0
	-0.07
dependency ratio	0.803
	(2.07)*
worked on someone else land or other employment?	0.278
	(2.60)**
dummy for households which harvested teff during last season	-0.105
	-0.91
dummy for households which harvested coffees last season	-0.943
	(5.02)**
dummy for household which harvested chat last season	-1.393
	(6.15)**
number oxen owned (bulls, oxen and young bulls)	-0.171
	(3.68)**
difference in rainfall level	-0.006
	(2.59)**
Variability of rainfall	0.044
	(11.52)**
Constant	1.056
	-1.61
Observations	2423

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Table 14: Marginal Effects of Logit estimate for the determinants of Chronic Poverty in urban Ethiopia: 1994-2000

Explanatory variable	Chronically poor
hhsz	0.237
	(5.64)**
mean age of household members	-0.13
	(2.49)*
dummy for female headed households	-0.318
	-1.37
age of household head	0.041
	-1.48
dummy for household with at least primary education	-0.805
	(3.42)**
dummy for wife with at least primary education	-0.372
	-1.39
household head private business employer	-2.078
	-1.67
household head own account worker	-0.503
	-1.78
household head civil servant	-0.08
	-0.25
household head public enterprise worker	0.153
	-0.4
household head private sector employee	-0.608
	-1.23
household head casual worker	0.751
	(2.09)*
household head unemployed	0.468
	-1.06
household mean age squared	0.002
	-1.93
age of household head squared	-.0003985
	-1.38
Addis	1.196
	(2.08)*
Amhara	-0.896
	(2.65)**
Oromo	-0.649
	-1.81
Tigrawi	-0.969
	-1.89
Gurage	-0.798
	(2.10)*
Harari	-33.518
	0
assetvalue	-.0004422
	(7.13)**
rate of unemployment-no of people not working/no of people within the 15-65 age	0.912
	(2.39)*
Constant	-0.024
	-0.02
Observations	881

Absolute value of z statistics in parentheses

* significant at 5%; ** significant at 1%

In urban areas, the determinants of chronic poverty are more or less consistent with the estimates on vulnerability, but, with slightly lower robustness (Table 14). The factors that are correlated with chronic poverty have the right signs one would expect, however with varying degree of statistical significance. For instance, except for Addis Ababa, none of the town fixed effects in the regressions of chronic poverty are significant (not reported), while most turned out to be important in the case of vulnerability. In some sense, the two measure different aspects of welfare. Chronic poverty as measured here focuses on the mean of consumption expenditure for each household over the observation period, while vulnerability here takes the standard deviations from this mean in each period by assuming a normal distribution of such deviations, which in this case is used as a simple approximation to consumption risk (see for example Shimeles, 2005 for further discussion and application of consumption risk in poverty measurement).

We provide in Figures 1 and 2 a sense of the distinction between the two by mapping our measure of vulnerability against our measure of chronic poverty. We note that the extent of vulnerability is extensive also among households that are well above the poverty line (the vertical line next to the y-axis) indicating the fact that even if some households could be above the poverty line, there is a real possibility of them falling into poverty, a situation not captured by a measure of chronic poverty. In this respect, chronic poverty and vulnerability to poverty do not measure exactly the same thing but much related concepts so that they complement each other.

Figure 1: Vulnerability and Chronic Poverty in Rural Ethiopia[15]

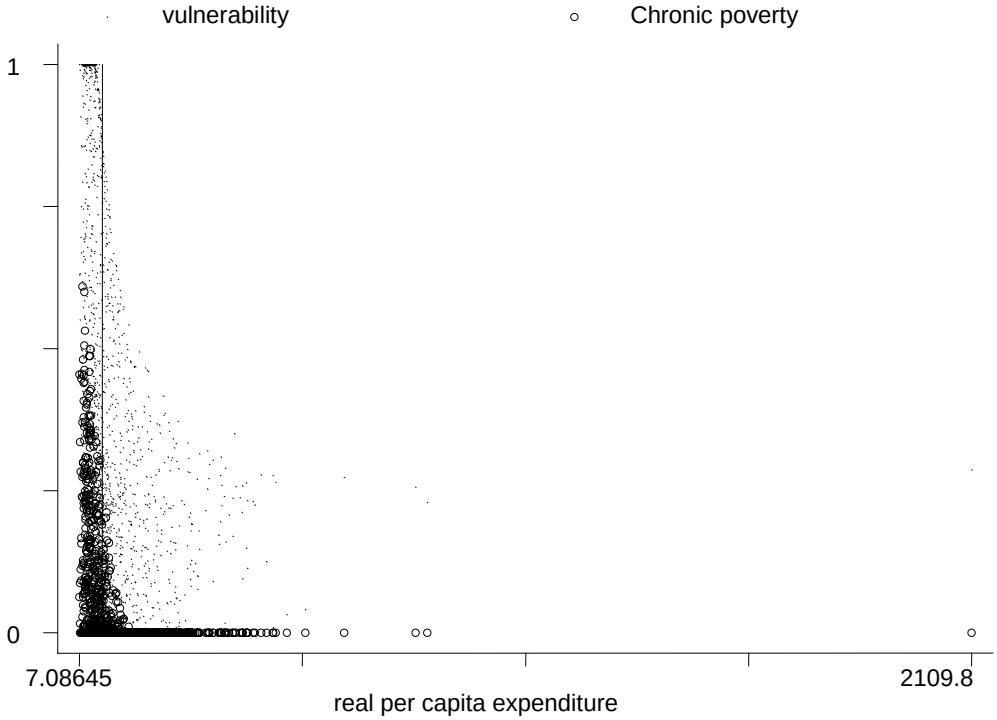
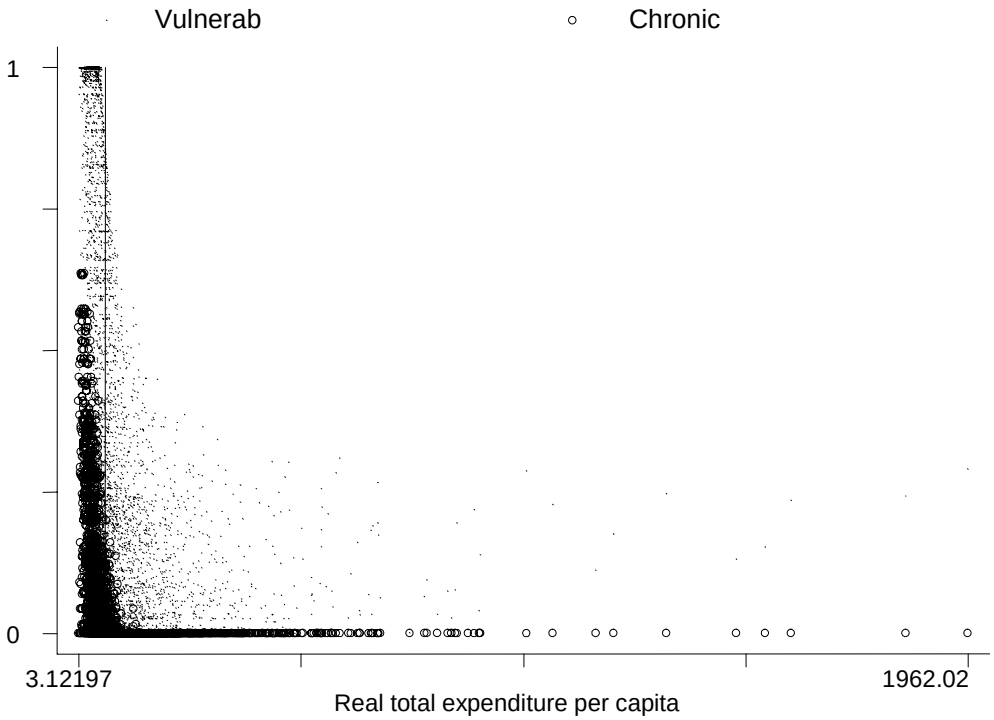


Figure 2: Vulnerability and Chronic Poverty for Urban Ethiopia



[15] Vulnerability stands for a measure of vulnerability, chronic poverty stand for a measure of the poverty gap using long-term consumption expenditure in both figures

4. Summary and Conclusions

For policy purposes it is important to make a distinction between chronic and transient poverty.[16] If poverty is chronic one requires long-term investments and structural reforms. The policy should build up the poor man's assets by enhancing human capital through education, health services and the like, and build up physical, natural and financial assets through grants, redistribution of access to land and natural resources. The policy package might also include redistribution of assets[17], direct investments in physical infrastructure, reduced social exclusion from employment, markets and institutions, and possibly some measures to provide more long-term social security. By investing in basic infrastructures, such as physical and financial infrastructures, the government can help reduce the transaction cost for households. A problem here is that the poor tend to live in less accessible areas or to have social positions that make it hard to help them. It is thus often expensive to help chronically poor people. Particularly since the WDR 2000 the issue of empowerment has come into focus.

If poverty is transitory one instead needs temporary interventions to support households during the bad spells. The measures one could envisage here are different forms of safety nets, credit and insurance schemes. Publicly organised safety nets in Ethiopia were virtually non-existent in earlier times, which meant that the drought in 1983-84 had disastrous effects. Recent episodes of droughts in Ethiopia, which are as severe as the earlier one, has had much less drastic consequences, because the government together with foreign donors and NGOs have built up a safety-net that can provide a certain level of food to households. To the extent that shocks are idiosyncratic local networks can cope with them, but when the shocks affect whole villages or regions they cannot cope. Transient poverty may be addressed by safety-net type of measures that help people manage their temporary problems and helps them to return to the status of non-poor. This could include limited-term unemployment allowances, social grants, workfare micro-credit or new skill-acquisition programmes (Hulme, Shepherd, 2003).

We have noted that the scope for consumption smoothing is limited in rural Ethiopia, which indicates that credit rationing is pervasive (not surprisingly). The credit market does not help much with the consumption smoothing. Households instead have to try to sell assets in bad times to survive, but this is hard in a situation when many households are in the same state and they all try to sell assets at the same time. The prices then tend to fall dramatically (Sen, 1981). Security can be improved by individually oriented measures and community oriented measures, including workfare, micro-finance, micro-enterprise development, and local infrastructure development through social funds.

[16] Jalan and Ravallion (2000) test whether transient poverty is determined by the same factors as chronic poverty in rural Chine. They find that the factors vary considerably between the two types of poverty and that the policies directed at chronic poverty may not be effective tools to deal with chronic poverty.

[17] Redistribution of assets, such as land, may also ease the credit constraints poor people face.

Our results show that poverty is relatively more persistent in urban areas than in rural areas in Ethiopia. The proportion of people who remained poor throughout the sample period in urban areas was slightly higher than rural areas, while the proportion of people out of poverty was significantly higher in urban areas suggesting limited mobility in and out of poverty. This fact is supported by the exit and re-entry probabilities where rural households find it easier to exit poverty as well as re-entering into it as compared to households in urban areas. In addition, both exit and re-entry rates decline substantially for urban households after one period spell in poverty or out of it. In addition, the standard result that exit or re-entry rates depend on the time spent in either spell is also supported by our data, particularly in the non-parametric hazard estimates. This suggests the need for different approaches to fight poverty in these areas. Security issues tend to be more important in rural areas, while expanding opportunities seem to be appropriate in urban areas.

Several of the covariates used to condition the probability of exit or re-entry performed well in the parametric estimation. We have attempted to compare proportional hazard models with logistic specifications of the exit and re-entry probabilities with also some element of controlling for unobserved household heterogeneity. In some instances, the hazard models performed better, for example in terms of ending a spell of poverty in the rural context and the logistic specification did well in the context of urban areas. Overall, the parametric hazard models captured the covariates that are relevant for ending poverty or non-poverty. Among other factors, the size of the household, education of the head or wife of the household, access to markets, rainfall etc. turned out to be significant in either facilitating exit or preventing re-entry into poverty.

In addition, our measure of vulnerability indicates that on the average the probability of a household being poor at any point in time during this period was about 40%, indicating the high degree of insecurity in the society. In rural areas such factors as age of the head of the household, dependency ratio within the household greatly affect the odds of moving into poverty. Whereas factors such as size of cultivated land, education of the head of the household, education of the wives, type of crops planted, access to local markets, reduce significantly vulnerability to poverty. In urban areas, household size, age of the head of the household, region of residence (particularly the capital) increase the chance of being in poverty. Such characteristics as occupation of the head of the household (excepting for casual workers), education of head of the household reduce significantly vulnerability to poverty.

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Annex Table 1a: Transition Probabilities by Expenditure Decile for Rural Households: 1994-2000

Decile	1	2	3	4	5	6	7	8	9	10
1	**22.41**	15.72	12.04	11.04	8.36	10.70	5.02	6.02	5.02	3.68
2	14.24	**17.55**	11.92	9.93	8.61	9.93	9.60	7.28	5.63	5.3
3	15.63	14.24	**9.03**	12.85	12.85	7.29	7.64	4.51	9.72	6.25
4	9.71	10.43	12.23	**12.95**	10.43	10.43	8.27	6.47	6.47	10.79
5	9.49	10.95	9.49	9.85	**9.49**	10.58	11.31	12.04	9.49	7.3
6	7.25	9.06	10.87	8.7	13.41	**9.42**	10.14	9.42	9.78	11.96
7	4.26	7.45	8.87	8.87	9.93	10.64	**9.93**	14.54	11.35	14.18
8	6.15	5.38	10.0	8.08	6.92	11.54	12.69	**10.38**	12.31	16.54
9	4.42	3.06	8.16	7.14	9.52	8.84	11.56	12.93	**19.05**	15.31
10	4.74	6.72	7.51	7.11	9.09	7.91	17.79	10.28	15.42	**13.44**

Annex Table 1b: Transition Probabilities by Expenditure Decile for Urban Households: 1994-2000

Decile	1	2	3	4	5	6	7	8	9	10
1	**37.08**	21.25	17.50	9.17	5.00	3.75	2.08	2.92	0.42	0.83
2	18.50	**23.23**	17.32	13.78	10.24	5.51	6.30	2.36	1.57	1.18
3	21.62	15.32	**14.86**	9.91	12.16	6.76	7.21	4.95	5.86	1.35
4	8.63	12.94	15.29	**14.90**	13.73	11.37	9.41	6.67	2.75	4.31
5	4.12	8.23	9.05	16.87	**17.70**	12.76	10.29	9.05	7.00	4.94
6	5.56	7.26	8.55	6.84	15.61	**18.80**	11.54	10.26	10.68	4.70
7	2.08	3.75	7-92	12.50	8.33	16.67	**17.92**	12.92	11.67	6.25
8	3.27	4.49	2.86	8.57	7.35	10.61	15.92	**18.78**	19.59	8.57
9	1.22	1.22	1.22	6.53	4.08	8.16	13.88	16.73	**24.90**	22.04
10	0.42	1.26	1.26	3.78	3.78	6.30	5.88	15.55	16.81	**44.95**