POVERTY TRANSITION AND PERSISTENCE IN ETHIOPIA[1]

Arne Bigsten[2] and Abebe Shimeles[3]

Abstract

Based on a rural and urban data set from Ethiopia, exiting from or re-entering poverty was found to depend on the time spent in or out of poverty. In comparison to urban areas, it was easier to exit or re-enter rural poverty. However, exiting poverty was more 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 analysed 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 first 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.[4] A household's consumption level at a specific time depends on its assets,

---

[1] The final version of this article was submitted in November 2006.
[2] Department of Economics, Göteborg University, Box 640, SE 405 30 Göteborg, Sweden
Arne.bigsten@economics.gu.se
[3] Department of Economics, Göteborg University, Box 640, SE 405 30 Göteborg, Sweden
Abebe.shimeles@economics.gu.se
[4] See surveys in Baulch and Hoddinott (2000), Hulme and Shepherd (2003), McKay and Lawson (2003), and Yaqub (2003).

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.[5] 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 (Bigsten et al., 2003). 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 and Shepherd, 2003, Rvallion and Jalan, 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.

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-structures.

[5] 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.

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 believe 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 spells 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 poverty spells and their determinants

The common approach to analyse poverty spells (e.g. Bane and Ellwood, 1986, Stevens, 1994, 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[6] (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.[7] 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:

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

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.
The parametric method on the other hand, models the distribution of spell durations via the probabilities of ending a spell.[8] Suppose we are interested in modelling the duration of poverty for household *i* which entered at t_0.[9] We can define a dummy δ_i=1 to distinguish households which completed the spell (exited out of poverty) from those who continued in the poverty spell, δ_i=0 at the end of the period (months, years or rounds in our case). The percentage that 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:

$$h_i(t) = pr(T_i = t / T_i \geq t;\ X_{it}) \qquad \textbf{(2)}$$

[6] That is, the relevant cohort to analyze poverty exit are those who were poor in round 1, while for re-entry are those who were non-poor in round 1.
[7] 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 poverty (see e.g. Bane and Ellwood, 1986, Stevens, 1999 and Devicienti, 2003). 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.
[8] We draw heavily from Jenkins (1995) and Stevens (1999) to discuss the parametric approach to modeling exit and re-entry rates.
[9] The same analogy applies for re-entry. So we restrict the discussion to the modeling of exiting from poverty.

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 $t=t_0$ 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 *t* , that is, [10]

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

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

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

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[11] by adding a multiplicative random error term[12] into equation (4) so that the instantaneous hazard rate becomes:

$$h(t \mid x_j) = h_0 \varepsilon_j \exp(x_j \beta_x) = h_0 \exp\lfloor X_j \beta + \log(\varepsilon_j) \rfloor \qquad \textbf{(5)}$$

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):

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

[11] 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.

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

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

If h_i follows a logistic structure, then:

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

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,

$$t_{idt} = \alpha_{id} + \beta X_{it} \qquad \textbf{(8)}$$

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:

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

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 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

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

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.[13] 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:

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

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.[14]

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 (Ravallion and Jalan, 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 periods, as follows:

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

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

$$T_i = P_i - C_i \tag{14}$$

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

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

[14] 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).

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.

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.[15]

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.[16]

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

[15] 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.
[16] 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.

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 who were 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 2a: Descriptive statistics for rural households by poverty status 1994-2000

	Never Poor	Once Poor	Twice poor	Three times poor	Always poor
Household size)	4.9	5.8	6.4	6.9	8.3
Age of head)	44.0	46.0	47.0	47.0	48.0
Female head (%)	23.0	22.0	18.0	22.0	16.0
Head completed primary school (%)	12.0	10.0	7.0	7.0	3.0
Wife completed primary school (%)	4.0	2.0	2.0	1.0	1.0
Land size (hectare)	1.1	0.9	.7	0.7	0.5
No of oxen owned	2.0	1.7	1.4	1.1	0.8
Crop sale (birr per year)	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	2.0	1.7	1.4	1.1	0.8

Source: authors' computation

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

	Never Poor	Poor once	Poor twice	Poor 3 times	Poor 4 times
Household size	5.7	6.3	6.6	6.9	7.6
Age of head	47.0	49.0	50.0	48.0	51.0
Female head (%)	40.0	44.0	46.0	39.0	43.0
Head completed primary school (%)	60.0	44.0	30.0	27.0	20.0
Wife completed primary school (%)	33.0	21.0	16.0	12.0	8.0
Private business employer (%)	3.0	2.0	2.0	0.0	0.0
Own account employee (%)	19.0	17.0	15.0	12.0	16.0
Civil servant (%)	21.0	15.0	11.0	9.0	9.0
Public sector employee (%)	9.0	7.0	5.0	6.0	5.0
Private sector employee (%)	6.0	5.0	5.0	3.0	3.0
Casual worker (%)	4.0	6.0	7.0	14.0	32.0
Unemployed (%)	4.0	4.0	7.0	4.0	9.0
Resides in Addis Ababa (%)	68.0	71.0	79.0	78.0	87.0

Source: authors' computation

Similarly, urban households (Table 2b) were consistently poor more often as their size and 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. Furthermore, 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 re-entry 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 that 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 of those that 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 1.1 and 1.2 in the appendix give a finer breakdown of transition probabilities by decile, but the picture is essentially 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).

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 3a and 3b, here the role of initial conditions and path dependence plays a significant role. Exiting poverty was much harder in urban areas than in rural areas, though the chance of slipping into poverty was higher in rural areas, 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. Generally low exit rate corresponds with high probability of staying in poverty. For example, in rural areas, the chance that a household would remain in poverty in all rounds since the start of a poverty spell in round one was 33%, while in urban areas it was 39%. Likewise, 68% of rural and 63% of urban households that had escaped poverty since round one would have fallen back in poverty within two rounds.

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

Rounds since start of poverty spell	Survivor function	Exit Rates
1	1.000	.28
	(.)	(.05)
2	0.72	.15
	(.0404)	(.02)
3	0.33	-----
	(.033)	
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' computations

Table 4b: Urban survivor function, poverty exit and re-entry rates using the Kaplan-Meier estimator

Rounds since start of poverty spell	Survivor's function	Exit Rates
1	1.000	.22
	(.)	(.05)
2	.78	.11
	(.06)	(.03)
3	0.39	……
	(.04)	
Rounds since start of non-poverty spell		**Re-Entry Rates**
1	1.000	0.32
	(.)	(0.05)
2	0.68	0.14
	(.05)	(.02)
3	0.37	--------
	(.03)	

Source: authors' computations

Whereas the exit and re-entry-rates reported on Table 4a and 4b summarized information (at least in the first row) for cohorts that could have begun poverty-spells (or out of poverty spells for re-entry) in 1994, Table 5 (below) reports rural and urban "hazard" rates, a measure of poverty persistence, only for the cohort that was first poor in 1995[17]. Of them, 53.4% (rural) and 58.1% (urban) remained in poverty only for one 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[18] 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	1.6	1.54
("mean years")	(3.5)	(3.25)

Source: authors' computations

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

4.2 Correlates of poverty-exit and re-entry

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 rather than another (see e.g. Devicienti, 2001).

[17] The relevant cohort is a poverty sequence (N, P, x, x), where N is non-poor, P is poor and x=(N,P). The hazard rate provides the probability that a household observed as non-poor in 1994 and became poor in 1995 would remain so in subsequent rounds.

[18] 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.

The simple hazard functions consider each spell as uncorrelated. In our case, the shortness of the panel does not allow for multiple spells, especially 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 a multiplicative error term capturing each individual household's unobserved characteristics and an 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 (Model 1), the proportional hazard model without unobserved household heterogeneity (Model 2), and the same model that incorporates unobserved household heterogeneity (Model 3).[19]

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 could imply 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.

[19] The formal specifications of these models are presented in section 2.

Table 6: Covariates of exiting poverty spell in rural areas

	Logit		Proportional hazards		Proportional hazard with heterogeneity	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Log of duration	-6.08	.000***	-4.91	0.00***	-4.83	.00***
Demographic						
Household size	-.21	.00***	-.13	.00***	-.48	.00***
Female head	-.06	.75	-.05	.64	-.29	.56
Mean age of the hh	-.00	.14	-.01	.23	-.03	.07*
Wife completed primary school	.03	.94	.04	.87	1.4	.20
Farming Systems						
Teff	-.11	.56	-.09	.43	1.05	.04**
Coffee	.46	.13	.39	.07	2.67	.03**
Chat	.76	.00**	.48	.00***	-1.4	.17
Enset	-.56	.06*	-.44	.03**	-.96	.75
Wealth:						
Asset value (birr)	.00	.01***	.00	.12	.00	.05**
Land size (hectare)	.13	.01***	.06	.02**	.141	.38
Noof oxen owned	.11	.15	.09	.04**	.46	.02**
Access to markets						
Population/distance to nearest town	.00006	.02**	.00003	.03**	.00002	.03**
Exogenous shock						
Rain variability (mm)	-.03	.00***	-.02	.00***	-.03	.08*
Change in rain (mm)	.0074	.00***	.0023	.26	-.04	.00***

Source: authors' computations
*** significant at 1%, ** significant at 5% and * significant at 10%.

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) 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.

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 rural poverty

	Logit		Proportional hazards		Proportional hazard with heterogeneity	
	Coeff	P-value	Coeff	P-value	Coeff	P-value
Log of duration	2.81	.00**	1.83	.00***	1.13	.00***
Demographic						
Household size	.21	.00**	.12	.00***	.21	.01***
Female head	-.16	.46	-.14	.36	-.24	.45
Mean age of the hh	.003	.72	-.000	.99	-.001	.92
Wife completed primary school	-1.37	.14	-.93	.20	-2.35	.14
Farming Systems						
Teff	-.39	.06*	-.20	.16	-.56	.25
Coffee	-.76	.09*	-.45	.09*	1.17	.09*
Chat	-.89	.15	-.61	.10*	-.53	.54
Enset	.76	.01***	.38	.05**	-1.22	.99
Wealth:						
Asset value (birr)	-.00061	.22	-.0004	.33	-.01	.00***
Land size (hectare)	-.23	.00***	-.20	.16	-.14	.14
Noof oxen owned	.11	.27	.050	.46	.20	.17
Access to markets						
Population/distance to nearest town	-.00004	.22	-.00002	.41	.00002	.65
Exogenous shock						
Rain variability (mm)	.00	.61	.03	.00***	.06	.00***
Change in rain (mm)	-.05	.00**	.00	.56	-.05	.32

Source: authors' computations
*** significant at 1%, ** significant at 5% and * significant at 10%.

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

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 8: Covariates of exiting urban poverty spell

	Logit		Proportional hazards		Proportional hazard with heterogeneity	
	Coeff	P-value	Coeff	P-value	Coeff	P-val
Log of duration	-2.23	.00***	-1.6	.00***	-1.69	.00***
Demographic						
Household size	-.24	.00***	-.09	.00***	-.2	.00***
Female head	-.19	.41	.050	.37	-.10	.72
Age of head	.005	.50	.008	.15	.010	.18
Mean age of household	.011	.40	.003	.70	.002	.19
Head completed primary school	1.250	.00***	.60	.00***	.560	.02**
Wife completed primary school	.394	.12	.023	.15	-.070	.82
Occupation of head						
Private business employer	2.28	.00***	1.40	.00***	.99	.23
Own account worker	.61	.02**	.31	.07**	.45	.23
Civil servant	.66	.04**	.47	.02**	.23	.58
Public sector employee	.007	.10*	.040	.19	-.290	.63
Private sector employee	.74	.09*	.50	.05**	.61	.22
Casual-worker	-.04	.94	.15	.60	1.20	.01***
Residence						
Addis Ababa	.69	.09*	.58	.02**	9.08	.00***
Awasa	.05	.94	-.01	.98	-4.90	.99
Bahir Dar	.04	.94	.21	.72	8.5	.00***
Dessie	-.19	-.77	-.00	.99	7.60	.00***
Dire Dawa	.79	.12	.85	.01***	9.00	.00***
Mekele	.83	.21	.92	.02**	19.80	.00***
Exogenous shocks						
Unemployment	-.70	.09*	-.4	.21	-.29	-.49
Ethnic Background						
Amhara	.19	.59	.19	.79	.11	.44
Oromo	.17	.68	-.08	.60	.27	.44
Tigrawi	.46	.39	-.14	.60	-9.8	.04**
Gurage	-.00	.99	.20	.29	.28	.48

Source: authors' computations
*** significant at 1%, ** significant at 5% and * significant at 10%.

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 re-entering poverty) in all three specifications. None of the other results are nearly so clear and consistent.

Table 9: Covariates for re-entering poverty spell for urban households

	Logit		Proportional hazards		Proportional hazard with heterogeneity	
	Coeff	P-value	Coeff	P-value	Coeff	P-val
Log of duration	.21	.41	-.14	.13	9.9	.00***
demographic						
Household size	.18	.01***	.08	.00***	.01	.23
Female head	-.02	.94	-.01	.12	-.09	.72
Age of head	-.01	.44	.00	.65	.00	.92
Mean age of household	-.01	.44	-.01	.17	-.00	.63
head completed primary school	-.89	.01***	-.46	.00***	-.19	.40
Wife completed primary school	-.29	.53	-.19	.19	-.65	.02**
Occupation of head						
Private business employer	-1.73	.19	-.68	.09*	-.45	.70
Own account worker	-1.01	.05**	-.19	.16*	-.17	.57
Civil servant	.19	.68	-.18	.25**	.16	.70
Public sector employee	.42	.62	.52	.01***	-.22	.64
Private sector employee	-.04	.95	.19	.39	-.113	.81
Casual-worker	1.56	.01***	.31	.03**	-.23	.52
Residence						
Addis Ababa	-1.66	.01***	-.43	.01***	.76	.18
Awasa	-.79	.36	-.11	.64	1.2	.08*
Bahir Dar	-1.9	.08*	-.49	.13	1.06	.21
Dessie	1.29	.24	.38	.18	.67	.39
Dire Dawa	-1.23	.27	-.27	.34	.81	.24
Mekele	-1.5	.15	-.07	.84	-1.08	.13
Exogenous shocks						
Unemployment	.78	.33	.49	.01***	-.01	.98
Ethnic Background						
Amhara	-.75	.17	-.13	.20	-.52	.35
Oromo	-.45	.44	-.05	.64	-.38	.29
Tigrawi	-.76	.35	-.76	.01***	-.52	.35
Gurage	.03	.96	-.25	.36	-.09	.79

Source: authors' computations
*** significant at 1%, ** significant at 5% and * significant at 10%.

4. "Vulnerability", chronic poverty and their determinants

Tables 10 and 11 report 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 occupations. At the low end, however, rural households were less vulnerable than urban ones, 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 significant effect of 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.

Table 12a: Determinants of vulnerability in rural Ethiopia: 1994-2000

household size	0.02
	(11.65)**
Farming systems	-0.185
	(12.47)**
Head is female	0.036
	(3.02)**
Head completed primary school	-0.059
	(3.25)**
Wife completed primary school?	-0.032
	-0.93
Size of land (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)**
Mmeanage2	0
	-0.4
Agehhh2	0
	-0.24
Dependency ratio	0.121
	(3.48)**
Off-farm 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 12b: Determinants of vulnerability in urban Ethiopia

Household size	0.02
	(8.17)**
Mean age of household members	-0.004
	-1.48
Head is female	-0.03
	(2.19)*
Age of head	0.007
	(3.86)**
Head completed primary school	-0.151
	(11.00)**
Wife completed primary school	-0.14
	(9.51)**
Head private business employer	-0.259
	(6.16)**
Head own account worker	-0.099
	(6.01)**
Head civil servant	-0.063
	(3.43)**
Head public enterprise worker	-0.027
	-1.24
Head private sector employee	-0.126
	(4.54)**
Head casual worker	0.09
	(3.90)**
Head unemployed	0.086
	(3.33)**
Dependency ratio (<15+>65)/ hhsz	0.294
	(9.29)**
Mean age squared	0
	-0.28
Age of household head squared	0
	(3.78)**
Addis	0.064
	(2.66)**
Awasa	0.019
	-0.59
Bahir Dar	-0.069
	(2.28)*
Dessie	0.107
	(2.90)**
Dire Dawa	-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%	

In the rural areas, land-size and the number of oxen owned as well as growing coffee or *chat* 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 unemployed reduced vulnerability (all but one at conventional significance levels), with private-business employer having by far the largest effect, followed by private-sector employee. Being a causal worker, or unemployed increased vulnerability. Residence in Addis or Dessie increased vulnerability, while residence in Bahir Dar reduced it. Relative to other ethnic groups in Ethiopia, all the major ethnic groups had reduced vulnerability, with Tigrawi the strongest effect.

We also ran logistic regressions of rural and urban chronic poverty against the same covariates (chronic poverty was defined as mean consumption-expenditure over the four survey rounds). Tables 13 and 14 report the marginal effects, which are generally consistent with the results above for vulnerability.

Again household size had a significant effect of increasing the probability of both rural and urban chronic poverty, as did age of the household head (though not conventionally significant) and the dependency ratio. Mean age of the household reduced chronic poverty, as did primary education, most significantly and strongly for the urban head, and last for the rural wife. Again having female-head had the opposite effects (increasing rural but reducing urban chronic poverty) though neither reached conventional significance levels.

In the rural areas, land-size and the number of oxen owned as well as growing cash-crops (coffee or *chat*) again reduced chronic poverty, as did change in rainfall, while rain-variability again increased it. Off-farm employment was again significantly correlated with increased chronic poverty.

In the urban areas, significance was lower for occupations but the pattern was generally the same. Asset-value reduced chronic poverty while the household rate of unemployment increased it. Residence in Addis Ababa increased chronic poverty, while all ethnic groups had reduced chronic poverty, though only Gurage and Amhara reached conventional significance levels.

Table 13: Rural marginal effects of logit estimate for the determinants of chronic poverty: 1994-2000

Household size	0.168
	(8.42)**
Dummy for non-enset growing areas	-1.026
	(6.62)**
Female headed households	0.185
	-1.43
Head completed primary school	-0.277
	-1.34
Wife completed primary school	-0.003
	-0.01
Land size 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)*
Off-farm 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: Urban marginal effects of logit estimate for the determinants of chronic poverty: 1994-2000

Household size	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
Head private business employer	-2.078
	-1.67
Head own account worker	-0.503
	-1.78
Head civil servant	-0.08
	-0.25
Head public enterprise worker	0.153
	-0.4
Head private sector employee	-0.608
	-1.23
Head casual worker	0.751
	(2.09)*
Head unemployed	0.468
	-1.06
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
Asset value	-.0004422
	(7.13)**
No of people not working/no of people within the 15-65 age group	0.912
	(2.39)*
Constant	-0.024
	-0.02
Observations	881

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

Figures 1 and 2 plot each rural or urban household's vulnerability (probability of being poverty) against its mean consumption. While those with mean per-capita consumption-expenditure below or near the poverty-line generally also had high vulnerability, even some with higher mean consumption were still quite vulnerable, indicating that the two measures, while different may both be useful for policy purposes.

Figure 1: Vulnerability and chronic poverty in rural Ethiopia[20]

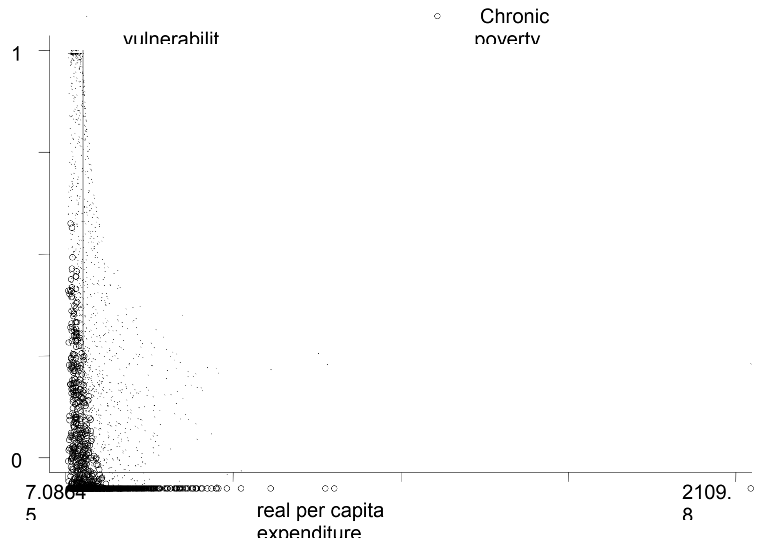
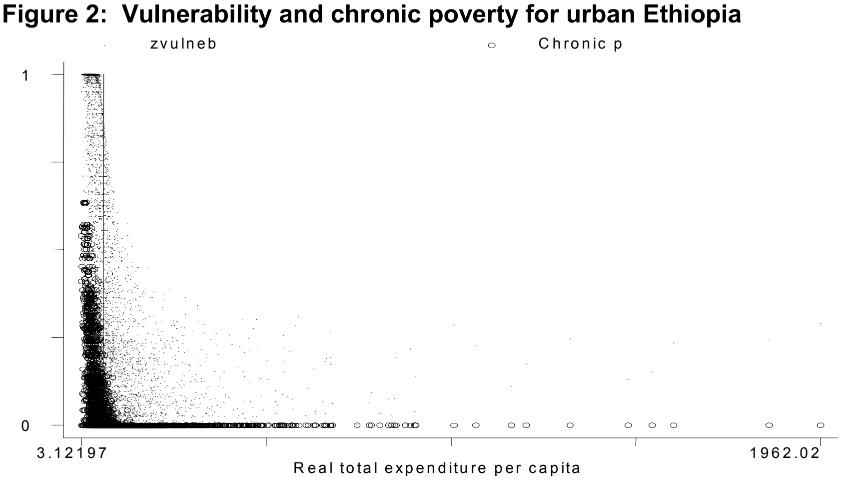


Figure 2: Vulnerability and chronic poverty for urban Ethiopia



[20] 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

5. Summary and conclusions

It is important to make a distinction between chronic and transient poverty for policy purposes.[21] To alleviate chronic poverty requires long-term investment and structural reforms to build up the assets of the poor by enhancing human capital through education, health services and the like, and enhancing financial and physical assets through grants, redistribution of land and natural resources.[22] The policy package might also include direct investments in physical infrastructure, reducing social exclusion via increased employment opportunities and access to markets, and possibly increased long-term social security. The poor tend to live in less accessible areas and to have social positions that make it hard and expensive to help them. But by investing in basic infrastructures, both physical and financial, the government can help reduce their transaction costs.

On the other hand, if poverty is transitory one instead needs temporary interventions to support households during the bad spells. Variability could be reduced and security improved by individually oriented and community-oriented measures, including workfare, micro-finance, micro-enterprise development, and local infrastructure-development, through social funds. If shocks are individual, local networks may able to cope, but if the affect whole villages or regions they cannot. Publicly organised safety nets were virtually non-existent in Ethiopia in earlier times, which meant that the drought in 1983-84 had disastrous effects. Recent droughts in Ethiopia, just as severe, had much less drastic consequences, because the government, together with foreign donors and NGOs, have built up a safety net that can at least provide a minimum level of food to the poor. Other programs, such as limited-term unemployment allowances, social grants, workfare micro-credit or new skill-acquisition programmes may all be called for (Hulme and Shepherd, 2003).

The scope for consumption smoothing is quite limited especially in rural Ethiopia, which means that credit rationing is pervasive. Households may 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.

[21] Ravallion and Jalan(2000) test whether transient poverty is determined by the same factors as chronic poverty in rural China. 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.
[22] Redistribution of assets, such as land, may also ease the credit constraints poor people face.

We found that poverty was more persistent in urban than in rural areas. The proportion of urban households that remained poor throughout the sample period was slightly higher than rural areas, as was the proportion of non-poor, suggesting less mobility in and out of poverty. Exit and re-entry probabilities showed that it was easier for rural households to exit poverty as well as to re-enter it. Both exit and re-entry rates declined more four urban households over time in a given state, a result confirmed by our non-parametric hazard-estimates. This suggests the need for different approaches to fighting rural and urban poverty. Reducing variability in rural areas, and expanding opportunities in urban areas could be appropriate strategies.

We compared a logistic specification of exit and re-entry probabilities with two proportional-hazard models, one controlling for unobserved individual heterogeneity. The hazard models performed better in the rural context, and the logistic specification in the urban. The size of the household, primary education of the head or wife, access to markets and rainfall levels and variability were statistically significant in either facilitating exit or preventing re-entry into poverty in rural areas.

The average probability of a household being poor during this period using our measure of vulnerability was 40%, indicating generally high insecurity. In rural areas, the age of the head and the dependency-ratio had significant effects in increasing vulnerability. Whereas land-size, primary education of the head and/or wife, growing coffee or chat, and access to markets had significant effects in reducing vulnerability. In urban areas, household-size, age of the head and town of residence (particularly in Addis Ababa) increased vulnerability, where as the primary education and occupation of the head (excepting for casual work) reduced vulnerability.

References

Anand, S., and J. Morduch (1996). Poverty and the population problem, Harvard University, Department of Economics, mimeo.

Antolin, P., T.T. Dang, and H. Oxley (1999). Poverty dynamics in four OECD countries, OECD Working Paper no 212.

Bane M.J. and D.T. Ellwood (1986). Slipping into and out of poverty: the dynamics of spells, *Journal of Human Resources*: 21(1): 1-23.

Baulch, B., and J. Hoddinott (2000). Economic mobility and poverty dynamics in developing countries, *Journal of Development Studies* 36(6): 1-24.

Bigsten, A., B. Kebede, A. Shimeles, and M. Taddesse (2003). Growth and poverty reduction in Ethiopia: Evidence from household panel surveys, *World Development* 31(1): 87-106.

Bigsten, A., and A. Shimeles (2005). Poverty and income distribution in Ethiopia: 1990-2000, Department of Economics, University of Gothenburg, mimeo.

Calvo, C. and S Dercon (2005). Measuring individual vulnerability, Discussion Paper Series ISSN 1471-0498, Department of Economics, Oxford University.

Chaudri, S., J. Jalan, and A. Suryahadi (2002). Assessing household vulnerability to poverty from cross-section data: a methodology and estimates from Indonesia, Discussion Paper 0102-52, Colombia University.

Christiansen, L., and Subbaro (2001). Towards an understanding of vulnerability in rural Kenya, World Bank, Washington, mimeo.

Dercon, S., and P. Krishnan (2000). Vulnerability, seasonality, and poverty in Ethiopia, *Journal of Development Studies* 36(6): 25-53.

Devicienti, F. (2003). Estimating poverty persistence in Britain. Working Paper Series no 1, Centre for Employment Studies, Rome, mimeo.

_______. (2001). Poverty persistence in Britain: A multivariate analysis using the British household panel survey, 1991-1997, *Journal of Economics*, 9 (supplement), 1-34..

Gunning, J., J. Hoddinott, B. Kinsey, and T. Owens (2000). Revisiting forever gained: income dynamics in the resettlement areas of Zimbabwe, 1983-1996, *Journal of Development Studies* 36(6): 131-54.

Haddad, L and A. Ahmed (2003). Chronic and transitory poverty: Evidence from Egypt 1997-99, *World Development* 31(1): 71-85.

Hansen, J and R. Walhlberg, (2004). Poverty persistence in Sweden, Discussion Paper 1209, Institute for the Study of Labour (IZA), Bonn.

Hoddinnott, J., and A. Quisumbing (2003). Methods for micro-econometric risk and vulnerability assessments: A review with empirical examples, International Food Policy Research, Washington, mimeo.

Hulme, D. and A. Shepherd (2003). Conceptualising chronic poverty, *World Development* 31(3): 403-23..

Jenkins, S. (2000). Estimation of discrete time (grouped duration data) proportional hazards models: Pgmhaz, University of Essex, mimeo.

_______. (1995). Easy estimation methods for discrete-time duration models. *Oxford Bulletin of Economics and Statistics* 57(1): 129-138.

Kamanou, G and J. Morduch (2002). Measuring vulnerability to poverty. Discussion Paper No 2002/58, World Institute of Development Economics Research.

Ligon, E and L. Schechter (2004). Evaluating different approaches to estimating vulnerability, University of California, Berkeley, mimeo.

_______. (2003). Measuring vulnerability, *The Economic Journal*, 113 (486): C95-C92.

McCulloch, N., and M. Calandrino (2003). Vulnerability and chronic poverty in rural Sichuan, Institute of Development Studies, University of Sussex, mimeo.

McKay, A., and D. Lawson (2003). Assessing the extent and nature of chronic poverty in Low Income Countries: Issues and Evidence, *World Development* 31(3): 425-39.

Pritchett, L., A. Suryahadi, and S. Sumarto (2000). Quantifying vulnerability to poverty: a proposed measure, with application to Indonesia Development Economics Working Papers 83, East Asian Bureau of Economic Research. Jakarta.

Ravallion, M. and J. Jalan, (2000). Is transient poverty different? Evidence from rural China, *Journal of Development Studies* 36(6): 850-875.

Rodgers, J., and Rodgers, J. (1991). Measuring the intensity of poverty among sub-populations: Applications to the US, *The Journal of Human Resources*, 21(2): 338-359

Sen, A. (1981), *Poverty and Famines: an essay on entitlements and deprivation,* Clarendon Press, Oxford.

Stevens, A.H. (1999). The dynamics of poverty spells: Updating Bane and Ellwood, *Journal of Human Resources*, 34(3):557-88.

_______. (1996). Climbing out of poverty, falling back in, *NBER Working Paper 5390*.

_______. (1994). The Dynamics of poverty spells: Updating Bane and Ellwood *American Economic Review*, 84:34-37.

Yaqub, S. (2003). Chronic poverty, scrutinizing patterns, correlates and explorations CPRC Working paper 21, Manchester IDPM, University of Manchester.

Appendix Table 1.1: Rural transition probabilities by expenditure Decile: 1994-2000

Decile	1	2	3	4	5	6	7	8	9	10
Poorest	**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
Richest	4.74	6.72	7.51	7.11	9.09	7.91	17.79	10.28	15.42	**13.44**

Appendix Table 1.2: Urban transition probabilities by expenditure Decile: 1994-2000

Decile	1	2	3	4	5	6	7	8	9	10
Poorest	**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
Richest	0.42	1.26	1.26	3.78	3.78	6.30	5.88	15.55	16.81	**44.95**