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ESTIMATING POVERTY MOBILITY IN TANZANIA: EVIDENCE FROM PSEUDO-PANEL DATA 1991-2018

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Estimating Poverty Mobility in Tanzania: Evidence from Pseudo-Panel Data 1991-2018

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Abstract

Using pseudo-panel data from five rounds of the Household Budget Survey (HBS), we estimate poverty dynamics (movement in and out of poverty over time) in Tanzania for more than a quarter-century. The study finding shows that while extreme poverty has declined significantly during this period, basic need poverty has only declined slightly, and remains high in rural areas. For poverty dynamics, the study finding shows that the percentage of households moving out of poverty has been declining over time. Furthermore, the study findings show a high degree of extreme (food) poverty mobility but a low basic need poverty mobility, where relatively high degree of poverty mobility is observed more for urban than rural areas. In addition, the findings reveal a greater proportion of households moving out of poverty than falling into poverty, however, the percentage of households falling and staying into poverty appears to increase over time, implying a decline in poverty reduction efforts. Our estimates are closer and more consistent with other recent estimates on poverty mobility and vulnerability in a couple of sub-Saharan African countries, including earlier studies in Tanzania. Our study adds to empirical literature that attempts to estimate poverty dynamics over a long period. More importantly, the study compares poverty dynamics over a long period by exploiting various cross-sectional surveys from 1991 to 2018 (over a quarter-century).

JEL Classification: C52, C53, I32

Keywords: poverty dynamics, mobility, pseudo panel, Tanzania

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1. Background and Motivation

There is a growing debate in Tanzania, as well as in most other countries in sub-Saharan Africa, that poverty reduction over more than a quarter-century has not matched the impressive and sustained economic growth¹. This is in contrast with the view that growth is a vehicle for achieving sustained poverty reduction. While economic growth has been improving over time, from about 3.2 percent in 1985-1995 to 6 percent since 1995 and 7 percent since 2000 (World Bank, 2019), poverty reduction has been slow and even slower more recently, especially from 2011 to 2018 (National Bureau of Statistics, 2019; World Bank, 2020). The evidence from the World Bank (2019) and the National Bureau of Statistics (2019) suggests that, although persistent poverty has continuously declined, falling by 7 percentage over 10 years, from 33.4 percent in 2007 to 26.4 percent in 2018, during the same period, extreme poverty (inability to meet minimum food needs) only slightly declined from 11.7 percent in 2007 to 8 percent in 2018. With the rate of poverty reduction slowing over time, consumption growth became less pro-poor, raising questions about whether the achieved poverty reduction is sustainable over time and whether the impressive growth translates into poverty reduction and reduced inequality.

The robust per capita GDP growth without significant poverty reduction neither improved livelihood in most sub-Saharan Africa countries, Tanzania being no exception, has thus attracted attention of many scholars and international communities. As result, there are growing body of studies examining the degree of poverty and its determinants in developing countries (see for the case of Tanzania for example Ellis and Mdoe (2003), Higgins (2011), Mashindano and Maro (2011), Pauw and Thurlow (2011), Osberg and Bandara (2012), Arndt *et al.* (2016), Magombeyi and Odhiambo (2019)). Even though, most of these studies assess the trends in poverty against various households' economic activities, resources ownership and exposure to various shocks such as climate and price shocks, which only examine factors associated with poverty at a point of surveys. The cross-sectional studies document that trends in poverty rates tend to differ according to the employment as well as geographical location (rural or urban), household's background characteristics as well as asset ownerships and exposure to various shocks (World Bank (2019), National Bureau of Statistics (2019, 2013, 2008, 2002)). The

¹ See for example Demombynes, G and Hoogeveen, J G (2007), Hoogeveen and Ruhinduka (2009), Atkinson AB and Lugo MA (2010), Mkenda et al. (2010), Brockington (2021), Kyara et al. (2022), Mashindano and Maro (2011).

studies also document a considerably higher poverty rate amongst agricultural households (especially food crops) compared to those in manufacturing or services; and those in rural areas compared to those in urban or suburban areas (Mashindano and Maro (2011), Osberg and Bandara (2012), Magombeyi and Odhiambo (2019)).

Evidence based on cross studies is, however, highly restrictive for drawing policy conclusions in the sense that they are static in nature and thus they do not account for the dynamic (mobility) aspect of poverty, whether poverty is a transitory or permanent condition as well as the vulnerability of households falling back into poverty (Dang *et al.*, 2014). Slow poverty reduction in one hand with impressive macroeconomic performances in recent years on the other hand has called for the need to understand the dynamic mechanisms behind it: is poverty chronic or transient? Thus, understanding poverty dynamic is important for providing answer to such a policy relevant question. This is as distinguished from cross-sectional poverty analysis which lack such inferences on poverty as a transitory or a chronic (permanent) condition. However, there are still large gaps in our understanding the poverty dynamic and the factors associated with transitions into and out of poverty.

The analysis of poverty dynamics and the factors behind such mobilities is fundamental for informing governments and other stakeholder on designing a better and appropriate intervention to cope with downward and upward poverty mobility and thus poverty reduction strategies (Dang *et al.*, 2014). This is because different policy instruments might be effective in addressing transitory and chronic poverty. For instance, if poverty is mostly transitory, safety net programs that prevent non-poor but vulnerable households from falling into poverty might be an effective tool for poverty reduction (Dang *et al.*, 2014). In case of chronic poverty, the structural and longer-term interventions such as investment in human capital and building infrastructure aimed at breaking the persistence of poverty might be an effective policy tool (Dang *et al.*, 2014; Dang and Lanjouw, 2017). Notwithstanding that, the absence of true panel data that survey same households (or individuals) over a long period to support such analysis are either not available and if available they suffer from usual problem of sample attrition, measurement errors and that the panel data are normally not nationally representative may explain the lack of such evidence in many developing countries (Dang and Lanjouw (2013)).

In Tanzania, although there exist sizable cross-sectional empirical studies on poverty analysis, little has been done to quantify the degree of poverty mobility. The available cross-section

analysis does not permit a full understanding of the dynamics that are critical for designing effective interventions. As alluded, absence of such analysis may have been influenced by the unavailability of genuine panel data that covers a long period. Taking the advantage of recent methodological innovations in the poverty dynamic analysis that make use of the panel data methods by Dang *et al.*, (2014) and Dang and Lanjouw (2013, 2017), we provide estimates of the degree of poverty mobility over a long period (more than a quarter century), hence contributing to the limited but growing body of empirical literature in this area. To do so, we estimate the degree of poverty mobility using pseudo-panel data (with year-of-birth cohorts) constructed from the five waves of the household budget surveys (HBS): 1991/92, 2000/01, 2006/07, 2011/12, and 2017/18. As distinguished from true panel, the main advantages of using cross sectional data are that may suffer less measurement errors and sample attrition problem and tend to be nationally representative over a long period (Dang *et al.*, 2014; Dang and Lanjouw 2017).

Taking advantage of pseudo-paned data constructed from six waves of Household Budget Survey (HBS), this study presents estimates of poverty mobility in Tanzania. The study uses a repeated cross-sectional data from 1992 to 2018 to estimate the rates of transitions into and out of poverty. Our contribution to this scarce and new field, yet growing body of empirical literature on poverty dynamics for the case of Tanzania are in three novel ways. First, while the existing studies examined poverty mobility between two periods, we provide an estimate of the possible poverty dynamics over a long period (for a more than a quarter century), from 1991 to 2018. The estimates provide a comparative estimate of the degree of poverty dynamics over different periods and the extent of poverty reduction over long periods (i.e., how poverty dynamic evolve over time) in Tanzania. This helps to shed more light on the debate that the solid per capita GDP growth over nearly decades did not translate into significant poverty reduction (not pro-poor). Second, the study extends the analysis to include an estimation of poverty mobility and immobility for extreme (food) and basic needs poverty against available evidence that have mostly based on one poverty type. Third, as poverty in Tanzania is more of a rural than urban phenomenon, we use the nationally representativeness of the HBS data and applying appropriate weights to estimate and compare poverty dynamics for rural and urban households separately. Using national representative data help us to avoid the common problem of true panel data such as attrition or measurement error and thus the estimated degree of mobility can be regarded as population estimate. To our knowledge, this is the first analysis of

study to provide estimates of poverty dynamics for long period and thus the evolution of poverty persistence and the magnitude of movements into and out of poverty in Tanzania.

The finding suggests that while extreme poverty has declined significantly during this period, basic need poverty has only slightly declined and remains higher in both rural and urban areas. With respect to poverty dynamics, we find a higher percentage of household tend to escape poverty but the rate of moving out of poverty tend to fall over time. More important, the study finding shows that while most household tends to escape from extreme (food) poverty, they remain trapped in basic need poverty and a very high degree of poverty mobility in urban than rural areas. Also, the findings suggest that a greater proportion of households are moving out of poverty than falling into poverty, but the percentage of people falling and staying in poverty appears to be increasing over time. Our estimates are consistent with other recent studies that estimate poverty mobility and vulnerability in Tanzania and other sub-Saharan Africa (SSA).

The rest of the paper is organized as follows. Section 2 review some empirical literature on poverty mobility based on developing countries and Tanzania as well. Section 3 presents the empirical and estimation strategy and section 4 describes the data. Section 5 presents and discusses the main results and section 6 summarizes and concludes.

2. Poverty Mobility: A Review of Literature

Studies on poverty mobility (chronic and transient poverty) are almost always based on true panel data, with observations of the same households over two or more points in time. While panel data may provide useful information for poverty dynamics, the absence of true panel data over a long period, especially in developing countries, has led to the use of pseudo-panel data constructed from cross-sectional surveys². The focus has mainly been on the household probability of entry and exit from poverty. More importantly, the dynamic analysis of poverty is critical for understanding whether poverty is a transitory status, or a permanent condition as distinguished from cross-sectional poverty analysis. Poverty transitions are important for designing appropriate and effective policy actions for poverty reduction and reduce inequality. In addition, understanding the factors behind income and poverty mobility helps governments and other stakeholders better understand the tools to cope with downward and upward mobility.

² Several studies provide validations that poverty transitions estimated from pseudo-panels closely match those based different from those using true panel data (See for example, Cruces *et al.*, 2014, Dang *et al.*, 2014, Dang and Lanjouw 2013, Salvucci and Tarp 2021).

Given its importance and the recent development of a systematic approach to analyzing poverty dynamics using cross-section data (in the pseudo panel), the subject has attracted the attention of various scholars that estimate the extent and degree of poverty mobility and the factor behind such a mobility. However, the literature on poverty mobility in developing countries, including Tanzania, remains scarce and limited despite high rates of poverty and rising inequality. We provide a brief review of available and relevant studies, specifically on poverty mobility in developing countries and Tanzania in particular.

Dang and Dabalén (2017) is one of the early studies on poverty mobility in sub-Saharan Africa that employed pseudo panel to estimate poverty mobility for more than 20 countries (where Tanzania is included in the sample) for a span of six years. Though the study found that chronic poverty and vulnerability to poverty were high, the percentage of the poor population escaping poverty was found to be larger than the percentage of the population falling into poverty suggesting pro-poor growth during the study period. Using Tanzania HBS data for 2006/07 and 2011/12, Dang and Dabalén (2017)³ found that during this period, 27.6 percent of households were in unconditional chronic poverty and 21.2 percent households experienced (unconditional) downward mobility. Using a similar approach, Dang *et al.*, (2014) estimated poverty transitions in Senegal and found that there existed a greater poverty mobility in and out of poverty between 2005 and 2011. More than half of the Senegalese population experiences changes in poverty status and more than 2/3 of the extreme (food) poor experienced upward mobility. Furthermore, the study found that factors such as rural residence, disability, exposure to natural disasters, and informality in the labour market were associated with an increased risk of falling into poverty.

More recently a study by Salvucci and Tarp (2021) estimating poverty transitions using a panel and a pseudo panel data in Mozambique found that poverty transitions estimated using pseudo panels provide results that are close to the true values obtained using the panel data. Specifically, the study shows that a high percentage of people staying in poverty over time appears to be substantially higher (about one-third of the population in most years) and that a greater proportion of people get out of poverty than falling into poverty.

Coming to Tanzania, studies that have attempted to estimate poverty dynamics and vulnerability using panel data (pseudo or true) are limited and scarce. To our knowledge, we

³ The study used a poverty line of \$1.90/day (in 2011 PPP dollars) for both periods.

find three related studies that focus on poverty and vulnerability in Tanzania that have employed panel data: Corta *et al.*, (2018), World Bank (2019) and Aikaeli *et al.*, (2021). Using Tanzania National Panel Survey (NPS) data covering 2008-2012, the study by Corta *et al.*, (2018) found that during this period, 12 percent of household experienced a sustained poverty escape; 5 percent remained chronically poor, and 10 percent moved into poverty at some point during this period. Furthermore, the study shows that household resources (land, livestock, electricity, piped water and saving), capacity and attributes (education and skills, household structures) and shocks (climate, price shocks, death of bread earner, illness, and associated costs) are the key drivers of the sustained and transitory escape from poverty.

World Bank (2019) provides a rigorous analysis on the evolution and profile of poverty dynamics (movement in and out of poverty) in Tanzania as well as its determinants. The study utilizes National Panel Survey (NPS) data for the period from 2008 to 2012 and a pseudo panel from HBS over the period of 2010 and 2014. Its findings on the poverty dynamics indicated that about 16 percent of households escaped poverty and about 12 percent of households fell into poverty; while about 60 percent of the population remained non-poor and 12 percent stayed poor.

Aikaeli *et al.*, (2021) estimate poverty dynamics and vulnerability to poverty using pseudo panel methods constructed from 2011/12 and 2017/18 HBS. The study results indicated that during this period 12.5 percent of the population remained in persistent poverty and 30 percent experienced transient poverty (moved out of poverty). In addition, the study found that rural and large households with many children are most likely to fall into poverty. Much more recently, a report by National Bureau of Statistics (2022) utilized panel data to analyze poverty dynamics in Tanzania show that for the period between 2014/2015 and 2020/21 about 48.9 percent of population escaped poverty and 20.7 percent of non-poor household in 2014/2015 fell into poverty.

Our study intends add to this previous empirical literature that attempted to estimate poverty dynamics and vulnerability in Tanzania. More importantly, the study examines the welfare dynamics and how it evolves over long period of time by exploiting various cross-sectional surveys from 1991 to 2018 (over 27 years) to capture the broader complexities of poverty dynamics and gauge any signs of structural transformation. As previous explained, the question of whether poverty is a transitory or a permanent condition is of interest for designing effective policy tools for poverty reduction and reducing inequality.

3. Methodology

This section provides a brief overview of empirical methods applied to construct a pseudo panel, estimate point as well as the upper and lower bounds of poverty transition in Tanzania. The methodology and the underlying assumptions of the theoretical framework are as detailed and discussed by Dang *et al.*, (2011, 2014b) and Dang and Lanjouw (2013) (i.e., the generalized point and bound estimation framework). The pseudo panel approach, as applied in this study, to estimate the point and bound estimates of poverty mobility (for poverty transition) are as based on Dang *et al.*, (2011, 2014b) and Dang and Lanjouw (2013); where the approach entails the construction of pseudo panel data from repeated cross-sections. Since cross-sectional survey data do not provide information on household consumption for the same households over time, the approach involves imputation such that the values of the relevant aggregates (income or consumption) for households observed at survey round 2 are estimated using households characteristics and welfare aggregates measured at round 1 and vice versa (Dang *et al.*, 2011, 2014b; Dang and Lanjouw 2013).

Under a certain assumption, the consumption model for round 1 based on time-invariant household characteristics is used to impute the household consumption for round 2 (Dang *et al.*, 2011). The approach involves, first, projecting the observed consumption at period 1 on time-invariant characteristics and second, the estimated OLS parameters from the consumption model of period 1 are then applied to the same time-invariant household characteristics at period 2 (applied to the same information collected in round 2). The household consumption in round 1 for households interviewed in round 2 is obtained in a similar approach.

Based on the approach by Dang *et al.*, (2011, 2014), we let y_{ij} denote the household consumption in survey round j for household i , where $i = 1, 2, \dots, N$ and $j = 1, 2$. Let X_{ij} be a vector of time-invariant household characteristics (such as household heads' age and education, sex, ethnicity, religion, language, place of birth, and parental education) that are observed in both survey rounds⁴, 1 and 2.

The projection of survey round $j(1,2)$ consumption y_{ij} onto X_{ij} is given by:

$$y_{ij} = \phi_1' X_{ij} + \xi_{ij}, \quad j = 1, 2 \quad (1)$$

⁴ The vector X_{ij} may also include time-varying household characteristics if retrospective questions about the round-1 values of such characteristics are asked in the second-round survey.

where y_{ij} and ξ_{ij} denotes the household consumption per adult equivalent (in logarithm) and ξ_{ij} denote the error term in survey round j . Based on the imputed consumption level based on equation 1, estimation of the degree of mobility in and out of poverty (poverty transition) involves quantifying the following poverty dynamics over the two periods.

$$P(y_{i1} < z_1 \cap y_{i2} > z_2) \text{ or } P(y_{i2} > z_2 | y_{i1} < z_1) \quad (2)$$

where Z_j denote the poverty line in period j (food or basic need poverty). Equation 2 represents the probability that household j is poor (food or basic need) in the first period but nonpoor in the second period. Therefore, the estimate of equation (2) represents the household degree of mobility “movement out of poverty or transient poverty” over two survey rounds (percentage of poor households in the first period that escapes poverty in the second period). However, in the cross-sectional surveys the true values of y_{i1} and y_{i2} are only observed once, either in periods 1 or 2 but not both. Dang *et al.*, (2011) provide and discuss the assumptions that need to be made to estimate point and bounds estimates from imputed values of equation 1 (Dang *et al.*, 2011). Two approaches are used to estimate the bounds on mobility: a non-parametric approach and a parametric approach. The non-parametric approach makes no assumptions about the joint error distribution while the parametric approach assumes joint error distribution is bivariate normal. In the non-parametric approach, lower bounds are normally estimated assuming no correlation ($\rho = 0$), and upper bounds are estimated assuming perfect correlation ($\rho = 1$).

The other quantity of interest include:

$$P(y_{i1} > z_1 \cap y_{i2} < z_2) \text{ or } P(y_{i2} < z_2 | y_{i1} > z_1) \quad (3)$$

Equation (3) estimates the probability that household j is non-poor (food or basic need) in the first period but poor in the second period (percentage of non-poor households in the first round that fell into poverty in the second round). The left expression of equation 3 provides the joint (unconditional) probability of poverty mobility and the right expression provides the conditional probability of poverty mobility. The equation estimates the probability of a household falling into poverty or “movement into poverty”. Therefore, equations 2 and 3 measure the movement in and out of poverty depending on household consumption per adult equivalent in survey round 2 and the estimated expenditure of the same household in survey round 1 (upward and downward mobility).

The household immobility degree is estimated by:

$$P(y_{i1} > z_1 \cap y_{i2} > z_2) \text{ and } P(y_{i1} < z_1 \cap y_{i2} < z_2) \quad (4)$$

where $P(y_{i1} > z_1 \cap y_{i1} > z_2)$ denote the probability that household i , who are non-poor in the first period remains non-poor in the second period and $P(y_{i1} < z_1 \cap y_{i1} < z_2)$ denotes the probability that households who are poor in the first period remain poor in the second period (chronic poverty). These probabilities can also be interpreted as population estimates of poverty mobility, moving in or out of poverty.

The estimation of mobility, equations (1)-(4), requires the availability of genuine panel data that traces the same household for the two periods. While panel data are always not available and if available cover only a short period of time and are mostly not nationally representative as they do not cover all the subgroups of the population due to limited resources. However, in the absence of panel data, poverty dynamics are estimated using pseudo-panel data constructed from repeated cross-sections.

To estimate the poverty mobility, Dang *et al.*, (2011, 2014) consider two assumptions, first, the underlying population sampled is the same in survey round 1 and survey round 2, and second, the error terms (ξ_{i1}, ξ_{i2}) are positive quadrant dependent (the correlation of error term is non-negative). More detailed information on the implications of these underlying assumptions and concrete procedures to estimate points and bounds using non-parametric and parametric approaches are widely discussed and can be referred to Dang *et al.*, (2011, 2014) and Dang and Lanjouw (2013).

Our study therefore follows the approach discussed in Dang *et al.*, (2011, 2014) and Dang and Lanjouw (2013), where we use survey-specific household weights to estimate both point and bounds estimates of poverty mobility in Tanzania. We follow closely the approach by Dang *et al.*, (2011) and the estimation sample is limited to households whose household head is 25–55 years of age.

4. Data and Descriptive Statistics

The study uses five waves of Household Budget Surveys (HBSs) collected by the Tanzania National Bureau of Statistics (NBS): 1991/92 (4,823 households), 2000/02 (22,129 households), 2006/07 (9,710 households), 2011/12 (10,182 households) and 2017/18 (9,418 households). HBSs is a nationally representative survey covering the population residing in

private households in urban and rural Tanzania Mainland. The HBS adopts a two-stage cluster sampling design. In the first stage, enumeration areas (primary sampling units – PSUs) are selected from Population and Housing Census frame, and in the second stage, households are systematically sampled from PSUs. The first round of scientific HBSs that represent urban and rural areas was conducted in 1991. Since then, NBS has completed four rounds of scientific HBS including the 2000/01, 2006/7, 2011/12, and 2017-18 HBS. The HBS collects information both at the individual level and household level. The individual level information collected included demographics; migration; education; literacy; labour market indicators; non-farm household businesses; and individual non-wage income, in addition household data on consumption and expenditure.

Table 1: Descriptive Statistics

	1991/92	2000/01	2006/07	2011/12	2017/18
	Mean/SD	Mean/SD	Mean/SD	Mean/SD	Mean/SD
Age in years	39.422 (10.477)	41.699 (12.665)	42.199 (12.628)	42.580 (12.306)	45.281 (11.430)
Male	0.839 (0.368)	0.773 (0.419)	0.763 (0.426)	0.762 (0.426)	0.729 (0.445)
Rural	0.775 (0.418)	0.781 (0.414)	0.711 (0.453)	0.662 (0.473)	0.636 (0.481)
Married	0.807 (0.394)	0.751 (0.432)	0.731 (0.444)	0.739 (0.439)	0.736 (0.441)
No Education	0.218 (0.413)	0.231 (0.422)	0.220 (0.414)	0.171 (0.377)	0.169 (0.375)
Primary	0.660 (0.474)	0.688 (0.463)	0.683 (0.465)	0.698 (0.459)	0.676 (0.468)
Secondary	0.059 (0.235)	0.065 (0.246)	0.080 (0.271)	0.100 (0.300)	0.113 (0.317)
Higher Education	0.002 (0.045)	0.004 (0.064)	0.005 (0.070)	0.011 (0.107)	0.016 (0.125)
Household size	5.740 (3.515)	4.973 (3.009)	4.830 (2.856)	5.057 (3.018)	4.869 (2.667)
Dependency ratio	0.387 (0.236)	0.411 (0.242)	0.410 (0.248)	0.406 (0.244)	0.411 (0.241)
Consumption (log)	8.269 (0.651)	9.364 (0.659)	10.039 (0.688)	11.104 (0.678)	11.332 (0.631)
Observations	4301	20776	9710	9411	7880

Notes. The *dependency ratio* is calculated as proportional to the household size of members aged 17 and less and those above 65. The summary statistics rates are estimated without any restriction on household age.

Source: Author's calculations based on Household Budget Survey (HBS) data.

Our main key variables of interest throughout all surveys include consumption per adult equivalent as well as household poverty status. All rounds of HBSs collected information on household consumption level for 28 days except for 2017/18 which collected for 14 days. We

use this information to calculate household monthly consumption. We also use household head demographic information such as gender, marital status, and education and household-level information such as household size, dependency ratio, and location (rural) to estimate the household consumption model. The main analysis is restricted to households with a household head aged from 25 to 55 years (See Dang *et al.*, 2011, 2014). Table 1 provides descriptive statistics of the key variables.

5. Empirical Results and Discussion

Since the poverty mobility estimates and the dynamics behaviour are critical in designing policies and programs that support social net policies for poverty (and income inequality) reduction; we are investigating the transition of poverty for the households over a long period of time. We present and discuss the poverty mobility estimates for equations 2– 3, based on pseudo panel constructed from consecutive wave of HBS data from 1991 to 2018. We start by presenting and discussing the poverty trends over the study period (subsection 5.1), followed by point estimates (subsection 5.2), and bound estimates (subsection 5.3) of extreme and basic needs poverty transition (entry and exit from poverty). We also estimate poverty transition separately for rural and urban as well as using the available national panel survey data for the period between 2014/15 and 2020/01 to do estimates for the sensitivity analysis and the determinants of poverty dynamics overtime.

5.1 Household Poverty Trends in Tanzania: 1991 - 2018

Table 2 presents the estimated long-term trend in household poverty rate at different levels of disaggregation (rural, urban, and national average) for each of household budget surveys. The estimation of households in food (extreme) and basic needs poverty (incorporating both food and non-food components) is based on poverty lines as defined in household budget surveys (see Appendix Table A1). The households are defined as food and basic needs poor if the household consumption per adult equivalent is less than the food and basic needs poverty line, respectively.

Table 2: Household Poverty (Extreme and Basic) Trends in Tanzania: 1991 – 2018

Survey year	Rural		Urban		National	
	Food (1)	Basic (2)	Food (3)	Basic (4)	Food (5)	Basic (6)
1991/92	17.28	31.69	10.19	20.34	15.80	29.32
2000/01	14.64	29.99	7.55	16.05	13.11	26.98
2006/07	14.14	30.46	8.08	16.17	12.44	26.44
2011/12	8.79	26.69	3.97	10.83	7.20	21.48
2017/18	6.96	24.60	3.17	11.75	5.62	20.05

Notes: The table reports the trend in households (extreme and basic needs) poverty (in percent) in Tanzania from 1991/92 to 2017/18. Each cell reports the percentage of the population in poverty (extreme or basic need poverty). Columns (1) and (2) report poverty dynamics for rural, columns (3) and (4) report poverty dynamics for urban and columns (5) and (6) report the national average of poverty dynamics. All numbers are weighted using household weights. The poverty rates are estimated without any age restriction.

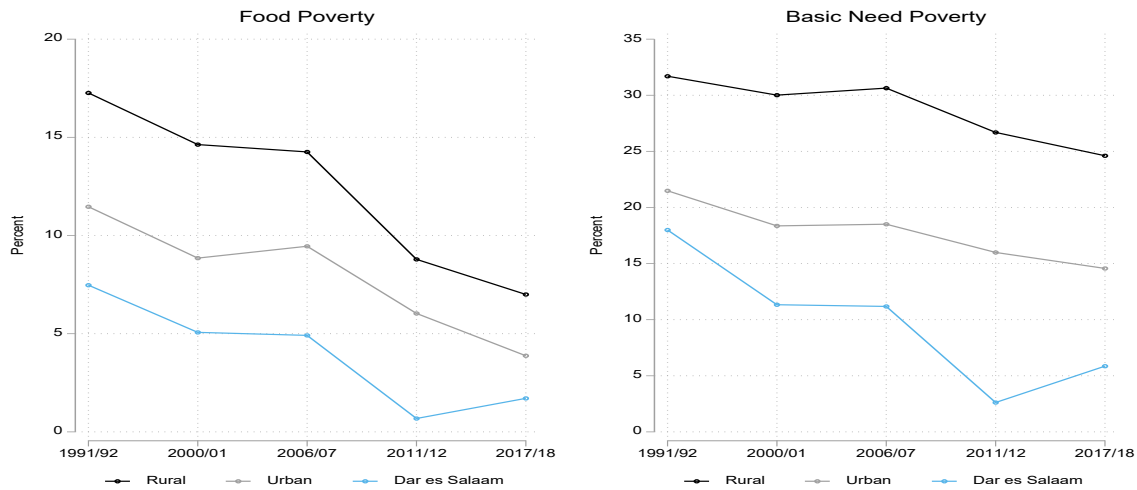
Source: Author's calculations based on Household Budget Survey (HBS) data.

The estimates of the household poverty rate as presented in Table 2 show that for both rural and urban, the poverty rate, both extreme and basic need poverty have shown a downward trend from the 1991/92 HBS to 2017/18 HBS. Extreme poverty in rural declined from 17.3 percent to about 7 percent (Column 1) while the basic needs declined from 32 percent to 25 percent (Column 2). During the same period, for urban households, extreme poverty declined from 10.2 percent to 3.2 percent while basic needs poverty declined from 20.3 percent to 11.8 percent (columns 3 and 4). Thus, while extreme poverty has significantly declined in percentage points (pp), 10.32 (17.28-6.96) for rural and 7.0 (10.19-3.17) for urban, the percent of households in basic needs poverty have somewhat remained high, both in rural and urban areas, 20 percent on average. The estimates show that while basic needs poverty declined by almost half in urban (from 20.3 percent to 11.8 percent), rural poverty (where there are majority of poor households) has slightly declined by only 7.1 percentage points (31.69-24.60). Overall, the estimates show a declining trend in both extreme/food poverty where food and basic need poverty at the national level, as declined from 15.80 to 5.62 percent (5.62 pp) percent for food poor and 29.32 to 20.05 percent ($\Delta = 9.27$) for basic needs poor between in 1991/92 HBS and 2017/18 HBS.

Furthermore, as shown in the Figure 1, household poverty rates are also presented separately for Dar es Salaam, other urban and rural areas, depicting the evolution of household poverty incidence between 1991/92 HBS and 2017/18 HBS. Consistent with previous results (in Table 2), the plot indicates that except for Dar es Salaam in recent years, both extreme and basic need poverty rates have constantly declined from 1991/92 HBS to 2017/18 HBS. While as for other

urban and rural areas both food and basic need poverty have been decreasing continuously, that for Dar increased modestly between 2011/12 and 2017/18. Similarly, the plot shows that while extreme poverty has sharply declined the basic need poverty has declined only slightly over the recent decades⁵.

Figure 1: Household Poverty Rates (%) Trends in Tanzania: 1991– 2018



Notes: The figure reports the trend in households (extreme and basic needs) poverty (in percent) in Tanzania from 1991/92 to 2017/18. The left plot shows the trends in household food poverty and the right plot shows the trend in basic need poverty separately for Dar es Salaam, other urban and rural. The estimations of household poverty rates are weighted using household weights. The poverty rates are estimated without any age restriction.

Source: Author’s calculations based on Household Budget Survey (HBS) data.

The estimates in Table 2 and Figure 1 are cross-sectional estimates (poverty at a single point in time), such that the estimates only show the change in poverty over time, but not the poverty dynamics or transition as indicated in equations (2) – (4). This implies that despite the fall in the overall poverty rate, there might be a considerable fraction of the households falling into and exiting from poverty throughout the period. The cross-section evidence only provides a partial explanation for the persistence of poverty. Thus, examining poverty dynamics provides a richer and more realistic portrait of the nature of poverty rate trend over time. The dynamic process of poverty mobility using pseudo-panel data is presented in the next two subsections. We discuss the results on overall poverty mobility before discussing the results on poverty dynamics by population groups; rural and urban (subsection 5.4). As will be observed, the dynamic patterns reveal a composition of the changes in poverty reduction, which is not seen from the net changes in poverty based on the cross sections.

⁵ Our estimates are in line with World Bank (2019) study which found that poverty declined faster between 2007 and 2012 than it has since and as compared to the recent period 2011-2018.

5.2 Poverty Mobility: Point Estimates

To estimate the degree of poverty dynamics (both point and bound estimates) in the period from 1991 – 2018, we first estimate the household consumption model using the logarithm of consumption per adult equivalent as dependent and time-invariant characteristics included as covariates: gender, age, and education level of the household head, asset score, rural and region dummies. The sample is restricted to households whose household head is between 25 and 55 years of age. The results of the consumption model are as presented in the Appendix Table A2.⁶ Then using the coefficients obtained from the consumption model we estimate the conditional and unconditional probabilities (as discussed by Dang *et al.*, (2014) and Dang and Lanjouw (2013)).

Extreme (Food) Poverty Mobility: Point Estimates

Table 4 presents the point estimates of the profile of chronic and transitory poverty, both for joint (Columns 1 – 2) and conditional (Columns 3 – 4) probabilities. The joint probability estimates show that 9.9 percent of the households remained in extreme poverty in 2000/01 as they were in 1991/92, implying they did not move out of poverty (i.e., are in chronic poverty). In the same period 1991 – 2001, about 9.4 percent of the household moved out of poverty (i.e., upward mobility). The poverty transitions are well depicted by the conditional probability as the estimates, showing that conditional on being in extreme poverty in 1991/92, 48.6 percent of households moved out of extreme poverty (i.e., transient poverty) by the year 2000/01. Also, the estimates show that during this period, about 4.5 percent of non-poor (non-extremely poor) households fell into the extreme poverty (i.e., downward mobility). As expected, the probability of being in extreme poverty was strongly conditional on the baseline poverty status, which implies that poverty in the current period being more likely among households that were previously in extremely poverty. However, the results show a considerable degree of exit from extreme poverty, whereby almost half of those in extreme poverty (48 percent) escaped poverty with the other half remaining chronically poor during this period.

The conditional poverty transition estimates between 2000 and 2007 reveals that 47 percent of those in extreme poverty in 2000/01 were able to move out of poverty by 2006/07 (this is equivalent to 5.6 percent of the total households as determined by the joint probabilities) while

⁶The estimated model show that head's gender, household size, dependence ratio, location (rural dummy) and household head's education level are strong predictor of household consumption level. Household age is only significant for 1991/92 HBS survey. For easy dispositional, the coefficients for region dummies are omitted.

53 percent remained in extreme poverty. About 92 percent stayed non-poor and the remaining 7.8 percent fell into food /extreme poverty. As compared to the previous period, there were increasing percent of households that fell into poverty and those exiting from poverty, though the magnitude of differences is low.

Similarly, the analysis of poverty dynamics between 2006 and 2012 show that 60.9 percent of household in extreme (food) poverty in 2006/07 become food non-poor by 2011/12 (equivalent to 7.9 percent of the entire households) and 39 percent remained in chronic poverty. Conditional on being non-poor 6.2 percent of household fell into extreme (food) poverty during this period. Comparing with the progress made during the previous periods, the results shows remarkable movement of households out of poverty during the 2006 and 2012 periods that of households falling into poverty. The higher exit rate and low entry rate into poverty during this period explain the faster declined between 2007 and 2012 than it has since and as compared to the recent period 2011-2018 (World Bank, 2019)

Table 4: Non-parametric estimates of Point Estimate of Extreme/Food Poverty Dynamics: 1991 – 2018

	Joint Probability		Conditional Probability	
	P	NP	P	NP
	2000/01	2000/01	2000/01	2000/01
Poor 1991	9.94	9.40	51.39	48.61
Non-poor 1991	3.60	77.06	4.47	95.53
	2006/07	2006/07	2006/07	2006/07
Poor 2000	6.35	5.56	53.30	46.70
Non-poor 2000	6.87	81.22	7.80	92.20
	2011/12	2011/12	2011/12	2011/12
Poor 2006	5.08	7.93	39.05	60.95
Non-poor 2006	5.40	81.59	6.20	93.80
	2017/18	2017/18	2017/18	2017/18
Poor 2011	4.74	5.34	47.02	52.98
Non-poor 2011	3.65	86.28	4.06	95.94

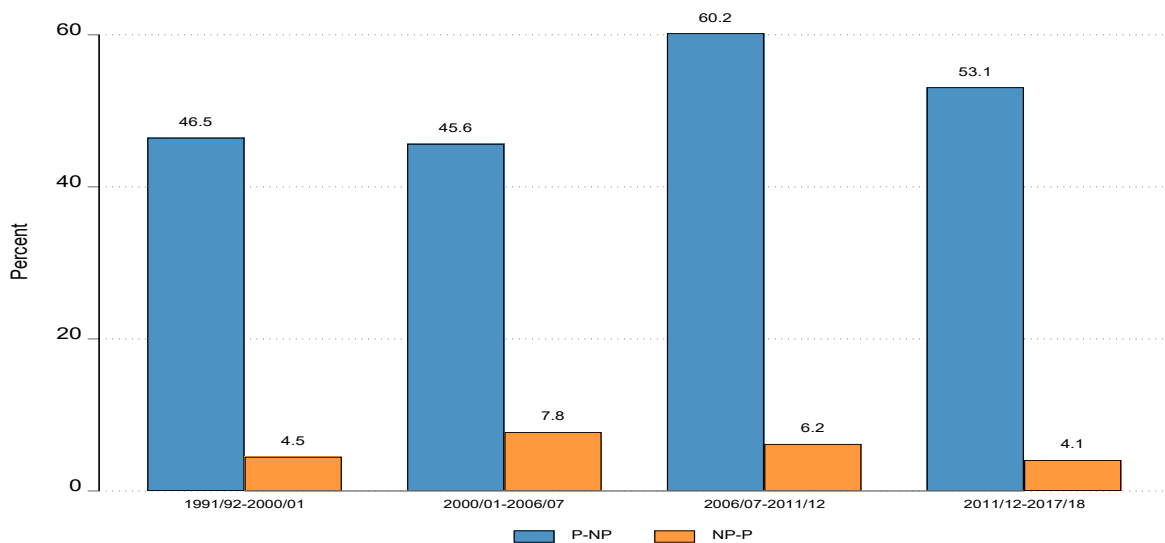
Notes: The table reports the synthetic panel point estimate (in percentage points) of extreme poverty mobility for Tanzania from 1991/92 to 2017/18. Each cell represents the share of the household in the state indicated by the row in survey year t and the column in survey year t+1. Columns 1 and 2 report the joint distribution point estimates and columns 3 and 4 report the conditional point estimates. To keep household units stable, estimation is restricted to households whose head's age is between 25 and 55 in the first survey (baseline) round and adjusted accordingly for the second survey (reference) round. The estimation of extreme poverty is based on the poverty line as in Table 3. The P and NP denote Poor and Non-Poor respectively.

Source: Author's calculations based on Household Budget Survey (HBS) data.

Using the two most recent surveys, 2011/12 HBS and 2017/18 HBS, the estimates of poverty mobility show that 5.34 percent of those extremely poor households in 2011/12 managed to escape from extreme poverty conditions (i.e., upward mobility) in 2017/18. Using the

conditional measure, 39 percent of the households were chronically poor (i.e., remained in extreme poverty) in the period 2006 – 2012, which increased to about 47 percent (8 pp increase) in the period 2012 – 2018. The changes are even more noticeable for those exiting out of poverty, where, conditional on being in extreme poverty in 2011/12, the percentage of the households that escaped extreme poverty were about 53 percent in 2017/18 as compared to about 61 percent in 2012 (8 pp fall). Conditional on being non-poor in 2012, about 4 percent fell back into extreme poverty, a rate that is lower than 6 percent of the previous period. The estimates reveal that though there were a significant fall in the proportional of households graduating out of extreme poverty, a higher percent of those in extreme poor during the baseline period – 2011 remained in extreme poverty. The findings correlate with the conclusion by the World Bank (2019) study which show that poverty (extreme poverty in particular) reduction during this period has been low and not responsive or matching to the remarkable economic growth the country has been attaining since mid-1990s.

Figure 2: Non-parametric estimates of Conditional Extreme (Food) Poverty Mobility: 1991 – 2018



Notes: The figure plots the conditional (extreme/food) poverty mobility from 1991/92 to 2017/18. *P* and *NP* denote poor and non-poor poverty status, respectively. *P-NP* means movement from poor status in period *t* to non-poor status in period *t+1* and *NP-P* is the movement from being non-poor in period *t* to poor in period *t+1*.

Source: Author’s calculations based on Household Budget Survey (HBS) data.

For easy comparisons over time, we plot the conditional probabilities of extreme poverty mobility for the household budget surveys pair, Columns 3 – 4. Figure 2⁷ presents the estimates of conditional poverty transitions in Tanzania over the entire period of study (1991 – 2018). Two poverty transitions are plotted, from poor to non-poor (P-NP) and from non-poor to poor status (NP-P). As shown, the transitions from poor to non-poor were higher during the period 2006/07 – 2011/12. However, the transitions out of poverty slowed down more recently, much lower transitions have been observed during the recent period 2011 – 2018 as compared to the 2006/07-2011/12. During these periods, the declining conditional poverty transitions were accompanied by increasing transitions from non-poor to poor with high transitions to lower welfare status being experienced between 2011 and 218.

Poverty (Basic Needs) Mobility: Point Estimates

Table 5 presents point estimates of joint (Columns 1 – 2) and conditional (Columns 3 – 4) probabilities of the basic need poverty mobility. The joint probability estimates show that 21 percent of households were in chronic poverty between 1991/92 and 2000/01, as they did not move out of poverty. In the same period 12.4 percent of households moved out of poverty. This translates to about 37 percent of the households moving out of poverty by 2000/01 conditional on being poor in 1991/92 (Columns 3 – 4). As for extreme poverty, during this period, 8.7 percent of households fell into poverty conditional on being non-poor (basic poor) in 1991/91.

The estimates of poverty transition conditional on being poor between 2000/01 and 2006/07 show that 36 percent of the basic poor households in 2000/01 were able to move out of basic poverty by 2006/07 (this is equivalent to 8.8 percent of the total households), while 64 percent were chronically poor. In contrast to the 8.7 percent of the earlier period, 13.8 percent of the households fell into poverty, conditional on being non-poor in 2000/01 (equivalent to 10.4 percent of the entire households) moved into poverty, while 86 percent remained non-poor. Between 2006 and 2012, 44.8 percent of basic poor households in 2006/07 moved out of poverty by 2011/12 (about 11.30 of the entire population).

⁷Figure A1 in the Appendix plot other conditional poverty mobility (immobility), households that stay in the same poverty status over the two periods, NP-NP and P-P. Consistent with the results in Figure 2, the plot shows a decreasing percentage of the household that remain in non-poverty (extreme/food) (NP-NP) with an increasing percentage of household that remains extremely poor (P-P). Again, these results indicate a lower transition out of poverty, that is poverty reduction has slowed over the recent decade.

Turning to the most recent period, 2011/12 and 2017/18, the conditional estimates (Column 3 – 4) show that 61.4 percent remained in chronic poverty while 38.6 percent moving out of poverty in contrast to 55 and 44.8 percent achieved during the previous period. Furthermore, 9.6 percent of non-poor households fell into poverty while 90.4 percent remained non-poor during the entire period. Comparing to the previous period, the results show that while there was a fall in percent of household falling into poverty and leaving poverty, poverty mobility, the percent of household remaining into poverty and non-poverty status increased by 6 and 4 pp.

Table 5: Non-parametric estimates of Point Estimates of Basic Needs Poverty Dynamics: 1991 - 2018

	Joint Probability		Conditional Probability	
	P	NP	P	NP
	2000/01	2000/01	2000/01	2000/01
Poor 1991	21.42	12.41	63.33	36.67
Non-poor 1991	5.74	60.43	8.67	91.33
	2006/07	2006/07	2006/07	2006/07
Poor 2000	15.63	8.82	63.94	36.06
Non-poor 2000	10.39	65.16	13.75	86.25
	2011/12	2011/12	2011/12	2011/12
Poor 2006	13.94	11.30	55.24	44.76
Non-poor 2006	10.14	64.62	13.57	86.43
	2017/18	2017/18	2017/18	2017/18
Poor 2011	14.25	8.96	61.39	38.61
Non-poor 2011	7.36	69.43	9.59	90.41

Notes: The table reports the point estimate of basic needs poverty mobility for Tanzania from 1991 to 2017. Columns 1 and 2 report the joint distribution point estimates while columns 3 and 4 report the conditional point estimates. To keep household units stable, estimation is restricted to households whose head's age is between 25 and 55 in the first survey (baseline) round and adjusted accordingly for the second survey (reference) round. The estimation of extreme poverty is based on the poverty line in Table 3. The **P** and **NP** mean poor and non-poor, respectively.

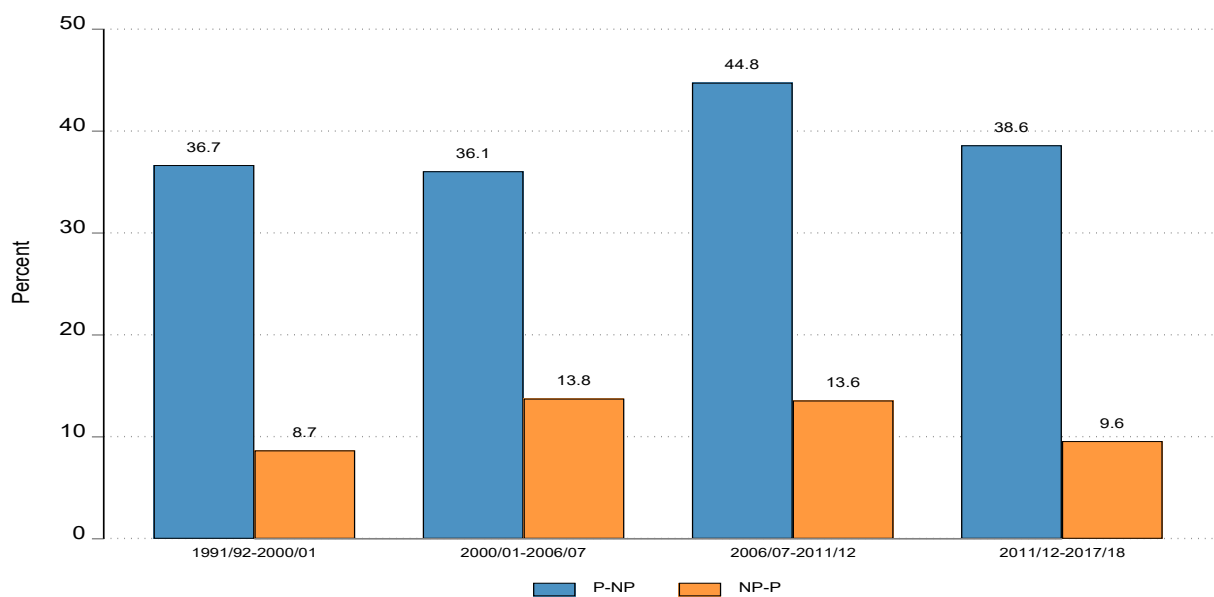
Source: Author's calculations based on Household Budget Survey (HBS) data.

Notwithstanding that, the estimates of poverty dynamics during this period are consistent with several other studies done earlier (see for example World Bank (2019) and Aikaeli *et al.*, (2021). The study by Aikaeli *et al.*, (2021) using the same dataset suggest that there was limited progress made in terms of poverty reduction during these years.⁸ A World Bank (2019) study on the dynamics of poverty between 2010 and 2015 that used the National Panel Surveys (NPSs) found that about 16 percent of households escaped poverty and about 12 percent fell into it. In surveys, about 60 percent of the population remained non-poor and 12 percent in chronic poverty. Another study National Bureau of Statistics (2022) examined poverty

⁸ In particular, the study shows that about 20.1 percent of non-poor households in 2011/12 were poor in 2017/18

dynamics using panel data for the period between 2014/2015 and 2020/21 showed that during this period about 48.9 percent of population escaped poverty and 20.7 percent of non-poor household in 2014/2015 fell into poverty in 2020/21⁹. Comparably, the recent study by Salvucci and Tarp (2021)) in Mozambique for periods 2008/09 and 2014/15 found that 69 percent, conditional on being poor in 2008/09, stayed poor in 2014/15 and 31 percent escaped from poverty.

Figure 3: Non-parametric estimates of Conditional (Basic) Poverty Mobility: 1991 – 2018



Notes: The figure plots the conditional (basic needs) poverty mobility from 1991/92 to 2017/18. P and NP denote poor and non-poor poverty status, respectively. P-NP means movement from poor status in period t to non-poor status in period $t+1$ and NP-P is the movement from being non-poor in period t to poor in period $t+1$.

Source: Author's calculations based on Household Budget Survey (HBS) data.

Figure 3¹⁰ plots the conditional probabilities of basic poverty mobility for the household budget surveys pair in Columns 3 – 4 in Table 5. The Figure presents the resulting estimates of conditional basic poverty transitions over the entire period of study from 1991 to 2018. As before, we plot two poverty transitions, poor to non-poor (P-NP) and from non-poor to poor status (NP-P) for each survey pairs. Consistent with the results in Figure 2, the transitions from

⁹ This means that, out of 4 people who moved out of poverty, there were two people who were originally non-poor, fell into poverty.

¹⁰ Figure A2 in the appendix plot other conditional poverty mobility (immobility), a household that stays in the same poverty status over the two periods, NP-NP and P-P. Consistent with results in Figure A1 (on extreme poverty), the plot shows a decreasing percentage of household that remain in non-basic poverty (NP-NP) with an increasing percentage of household that remains in basic poverty (P-P) over time. Again, these results indicate a lower transition out of poverty, that is the basic poverty reduction has slowed over the recent decade.

poor to non-poor were higher and increasing during the period 1991 – 2001 to 2001 – 2007. During these periods, the declining on conditional poverty (basic) were accompanied by falling transitions from non-poor to poor status with high transitions to lower welfare status being experienced between 2006 and 2012. However, the transition in and out of poverty slowed over the recent period for 2011 – 2018, where transition out of poverty fell to 38.6 as compared to 44.8 and movement into poverty went down by 4 pp from 13.6 to 9.6. This implies that the recent recorded poverty was more determined by poverty persistent than the poverty mobility. The higher transitions in and out of poverty for this period are also reported by Aikaeli *et al.*, (2021) suggesting a limited progress in terms of poverty reduction during this period.

5.3 Poverty Mobility: Bound Estimates

While point estimates are more restrictive in terms of assumption, in this subsection, we refine our point estimates by estimating the bound estimates of poverty transition in Tanzania. The bound estimates provide the upper and lower limit of poverty transition in the absence of actual panel data. Tables 6 and 7 present the upper and lower bounds estimates of extreme and basic poverty transition based on pseudo panel data. While Table 6 presents the joint and conditional bound estimates of extreme (food) poverty mobility, Table 7 presents joint and conditional bounds estimates for basic poverty mobility. The bounds estimates are estimated assuming $\rho = 1$ for lower and $\rho = 0$ for upper poverty bound. The focus in this section is to provide the interpretation of these bound estimates and then compare it with the previously presented and discussed point estimates in Section 5.2.

Extreme (Food) Poverty Mobility: Bound Estimates

Table 6 shows the lower and upper bounds of transitions in and out of extreme (food) poverty of all survey pairs from 1991 to 2018 based on our consumption prediction models (equation 1); where the results show a wide range (the gap between upper and lower poverty mobility estimates) of the possible extreme poverty transitions. However, even within that wide range, the estimates show a consistent message for the point estimates, that the transition out of extreme poverty was higher before 2011/12 and compared to the period between 2017/18. In addition, the estimate reveals that the percentage of households moving into extreme poverty and those remaining in extreme poverty has increased more recently, in the period between 2011/12 and 2017/18. Consistent with the point estimates, the bound estimates of poverty transitions into and out of poverty point to the slow pace of poverty reduction over the recent decade.

Table 6: Non-Parametric Estimates of Extreme (Food) Poverty Mobility: 1991 – 2018

	1991 -2000		2000-2006		2006-2011		2011-2017	
	lb	ub	lb	ub	lb	ub	lb	ub
<i>Panel A: Joint Probabilities</i>								
Poor, poor	12.66	2.96	10.32	2.43	9.13	1.74	5.87	0.95
Poor, non-poor	6.06	12.14	0.39	10.77	2.78	9.81	1.99	7.64
Non-poor, poor	0.00	9.71	1.51	9.40	0.03	7.42	0.44	5.36
Non-poor, non-poor	81.28	75.20	87.78	77.40	88.06	81.03	91.69	86.04
<i>Panel B: Conditional Probabilities</i>								
Poor, poor	67.64	19.59	96.36	18.39	76.63	15.03	74.67	11.06
Poor, non-poor	32.36	80.41	3.64	81.61	23.37	84.97	25.33	88.94
Non-poor, poor	0.00	11.43	1.69	10.83	0.03	8.39	0.48	5.87
Non-poor, non-poor	100.00	88.57	98.31	89.17	99.97	91.61	99.52	94.13
Observations	13056	13056	6627	6627	7015	7015	6208	6208

Notes: The table reports the non-parametric estimates of extreme (food) poverty mobility for two successive HBS surveys from 1991 to 2017. The rows give the fraction of households in the selected age range (25-65) that is in each of the four categories. For example, '*Poor, poor*' indicates the fraction that was poor in year t and remained poor in year t+1. The upper-bound (**ub**) estimates for poverty mobility (and lower-bound (**lb**)) estimates for poverty immobility) are obtained by taking their average values over 200 repetitions.

Source: Author's calculations based on Household Budget Survey (HBS) data.

Basic Poverty Mobility: Bound estimates

The lower and upper bounds of joint and conditional probabilities of transitions in and out of (basic needs) poverty for survey pairs from 1991 to 2018 are as shown in Table 7 (the rows reflect the pair of poverty status). As for the bound estimates of extreme poverty transition, the results show a wide range (the gap between upper and lower poverty mobility) of the possible poverty transitions. Looking at the trends of poverty transitions over time, even within that wide range, the estimates show a consistent message with the point estimates, that transition out of (basic need) poverty was higher before 2011/12 as in the period between 2011/12 and 2017/18. Such that, the percentage of households moving into (basic) poverty and those remaining in poverty fall overtime with a higher increase for the period between 2011/12 and 2017/18.

In terms of magnitude, the estimate shows that about 32.17 percent to 85.07 percent of household's conditional on being poor in 2011/12 were also poor in 2017/18. The estimate also reveals that 2 percent to 19 percent of non (basic) poor households in 2011/12 fell into poverty by the year 2017/18 conditional on being non-poor in 2011/12. The increase in the percentage of households staying in poverty and those moving into poverty (conditional on being poor or non-poor in 2011/12), was associated with a declining percentage of households moving out

of poverty and those remaining non-poor (improved welfare). Consistent with the point estimates, the bounds estimate of extreme poverty, the changing nature of poverty transitions into and out of poverty point to a slow pace of poverty reduction in the recent decade (or more recently).

Table 7: Non-Parametric Estimates of Basic Needs Poverty Mobility: 1991 – 2018

	1991 -2000		2000-2006		2006-2011		2011-2017	
	lb	ub	lb	ub	lb	ub	lb	ub
<i>Panel A: Joint Probabilities</i>								
Poor, poor	26.52	10.69	24.30	9.75	23.02	8.30	20.34	6.79
Poor, non-poor	8.29	18.69	0.32	16.04	2.09	15.05	3.57	14.31
Non-poor, poor	0.00	15.84	2.14	16.69	0.79	15.51	1.54	15.09
Non-poor, non-poor	65.19	54.79	73.24	57.52	74.10	61.14	74.55	63.81
<i>Panel B: Conditional Probabilities</i>								
Poor, poor	76.18	36.38	98.71	37.81	91.69	35.54	85.07	32.17
Poor, non-poor	23.82	63.62	1.29	62.19	8.31	64.46	14.93	67.83
Non-poor, poor	0.00	22.42	2.84	22.49	1.05	20.24	2.03	19.13
Non-poor, non-poor	100.00	77.58	97.16	77.51	98.95	79.76	97.97	80.87
<i>Observations</i>	13056	13056	6627	6627	7015	7015	6208	6208

Notes: The table reports the non-parametric estimates of basic poverty mobility for two successive HBS surveys from 1991 to 2017. The rows give the fraction of households in the selected age range (25-65) that is in each of the four categories. For example, 'Poor, poor' indicates the fraction that was poor in year t and remained poor in year t+1. The upper-bound (**ub**) estimates for poverty mobility and lower-bound (**lb**) estimates for poverty immobility) are obtained by taking their average values over 200 repetitions.

Source: Author's calculations based on Household Budget Survey (HBS) data.

5.4 Poverty Mobility: Rural and Urban

For quite a while now, it has been established that poverty in Tanzania is more of a rural phenomenon than urban, as the household poverty rate in rural areas is about 24.6 percent in rural compared to 11.75 percent in urban areas, so is in 2017/18 HBS (Table 2). This is also well reflected in our earlier estimates as shown in Table 2 and Figure 1 with rural areas having a higher level of poverty (both extreme and basic) across all surveys. We separately estimate the point estimates of (extreme and basic) poverty transitions for rural and urban areas in Tanzania. To keep the presentation more concise, we only report and discuss conditional poverty mobility that includes chronic poverty, upward mobility, and downward mobility. Table 8 presents the conditional probabilities, the estimate of extreme poverty transitions while Table 9 presents the conditional probabilities estimate of basic poverty transitions by location of residence (rural against urban)¹¹.

¹¹ The joint probabilities for rural and urban are in Appendix Table A3 and A4.

The estimated results for extreme poverty transitions by location of residence can be discussed by considering two periods, before and after 2011/12. The estimate in Table 8 shows that, for both urban and rural areas, conditional on being poor in the baseline over 60 percent of the extremely poor households moved out of extreme poverty for the period between 1991 and 2012. The estimates of households moving out of extreme poverty are higher for the rural households than urban households. The percentage of households remaining in extreme poverty during this period was also high for urban but with less than 40 percent in rural and in urban areas. However, the number of households falling into extreme (food) poverty were high in rural as compared to households in urban areas.

However, these statistics changed considerably for the period between 2012 and 2018. For instance, in rural areas, about 40 percent of extremely poor households in 2011/12 remained poor in 2017/18, and about 6 percent of non-poor in 2011/12 were extremely poor in 2017/18. Only 94 percent (as compared to over 93 percent) of non-extreme poor households remained non-poor in the year 2017/18. Though smaller in magnitude as compared to rural areas, the percentage of households remaining in extreme poverty or moving into extreme poverty significantly increased as compared to those before 2011/12 for urban households. For example, 4 percent of non-extreme poor households in 2011/12 were extremely poor in 2017/18 and 19 percent remained in extreme poverty during these periods. Consistent with previous results, the estimated results show that poverty reduction slowed over recent periods with a much slow reduction in rural areas.

Table 9 shows the estimates for the basic poverty transitions by location of residence. In line with the previous findings, as in Table 8, the results in Table 9 show that for both urban and rural areas, over 50 percent of those poor households in the baseline moved out of poverty for the period between 1991 - 2012. The share of households remaining in non - (basic) poverty status (conditional on being non-poor in the baseline) during this period (before 2011/12) was also high, over 40 percent in rural and in urban areas. The share of households falling into (basic) poverty status and the number of those remaining in extreme poverty were high in rural as compared to households in urban areas for the two recent periods.

Table 8: Non-Parametric Estimates of Extreme Poverty Conditional Probabilities by Location: 1991 – 2018

Year	1991/92-2000/01	2000/01-2006/07	2006/07-2011/12	2011/12-2017/18
<i>Panel A: Rural</i>				
Poor, poor	34.63	25.20	30.39	39.98
Poor, non-poor	65.37	74.80	69.61	60.02
Non-poor, poor	10.87	14.88	6.93	6.23
Non-poor, non-poor	89.13	85.12	93.07	93.77
<i>Panel B: Urban</i>				
Poor, poor	47.84	38.77	28.49	19.03
Poor, non-poor	52.16	61.23	71.51	80.97
Non-poor, poor	1.58	3.26	3.68	4.06
Non-poor, non-poor	98.42	96.74	96.32	95.94

Notes: The table reports the synthetic panel point estimate (in percentage points) of extreme poverty mobility (conditional probabilities) for Tanzania from 1991/92 to 2017/18. Each cell represents the share of households in the state indicated by the row in survey year t and the column in survey year $t+1$. The estimation is restricted to household heads aged 25 to 55 in the base survey (left column) and adjusted accordingly (added time interval between the two surveys) for the reference period. The estimation of extreme poverty is based on the poverty line as in Table 3. The P and NP denote Poor and Non-Poor respectively.

Source: Author's calculations based on Household Budget Survey (HBS) data.

For the period between 2011/12 and 2017/18, the share of households remaining in poverty and those falling into poverty increased considerably for rural households but fell for urban households. In rural areas, about 56.7 percent of poor (basic) households in 2011/12 remained poor in 2017/18 and about 15 percent of non-poor (basic) in 2011/12 became poor in 2017/18. Only 84.7 percent (as compared to over 82.5 percent) of non (basic) poor households remained non-poor in the year 2017/18. For households in urban areas, the percentage of households remaining in poverty improved significantly as compared to those before 2011/12. For instance, 69.4 percent of poor households in 2011/12 were non-poor in 2017/18 and 30.6 percent remained in extreme poverty during these periods as compared to 58.5 and 41.5 recorded in the preceding period. Overall, and consistent with previous studies, the estimated results show that poverty reduction slowed over the recent periods, and much slower reduction in rural areas.

Table 9: Non-Parametric Estimates of Basic Poverty Conditional Probabilities by Location: 1991 – 2018

Year	1991/92-2000/01	2000/01-2006/07	2006/07-2011/12	2011/12-2017/18
<i>Panel A: Rural</i>				
Poor, poor	49.84	41.63	49.56	56.65
Poor, non-poor	50.16	58.37	50.44	43.35
Non-poor, poor	21.01	28.59	17.60	15.26
Non-poor, non-poor	78.99	71.41	82.40	84.74
<i>Panel B: Urban</i>				
Poor, poor	56.24	47.51	41.46	30.63
Poor, non-poor	43.76	52.49	58.54	69.37
Non-poor, poor	3.68	7.05	9.20	10.53
Non-poor, non-poor	96.32	92.95	90.80	89.47

Notes: The table reports the synthetic panel point estimate (in percentage points) of extreme poverty mobility (conditional probabilities) for Tanzania from 1991/92 to 2017/18. Each cell represents the share of households in the state indicated by the row in survey year t and the column in survey year $t+1$. The estimation is restricted to household heads aged 25 to 55 in the base survey (left column) and adjusted accordingly (added time interval between the two surveys) for the reference period. The estimation of extreme poverty is based on the poverty line as in Table 3. The P and NP denote poor and non-poor respectively.

Source: Author's calculations based on Household Budget Survey (HBS) data.

6. Conclusion and Implication

We investigate poverty dynamics in Tanzania using pseudo panel data from five rounds of the household budget surveys (i.e., 1991/92, 2000/01, 2006/07, 2011/12 and 2017/18). We follow the approach by Dang *et al.*, (2014) and Dang and Lanjouw (2013) to construct a pseudo panel to estimate the point and bound estimate of poverty dynamics. What we found is that, while extreme poverty has declined significantly during this period, basic need poverty has only slightly declined and remains higher both rural and urban areas. With respect to poverty dynamics, we find that a higher percentage of household tend to escape poverty but the rate of moving out tend to fall over time. Furthermore, the results point to higher upward mobility (moving out of poverty) in the period from 1991 to 2012 than in the period from 2012 to 2018. More importantly, the finding shows a high degree of extreme (food) poverty mobility but low basic need poverty mobility, and a very high degree of poverty mobility is observed for urban than rural areas.

In addition, the findings show a greater proportion of households moving out of poverty than falling into poverty, however, the percentage of household falling and staying into poverty appears to increase more recently. Our estimates are closer and more consistent with findings from a couple studies done recently that estimate poverty mobility and vulnerability in Tanzania and several other SSA countries. By comparing poverty dynamics over a long period

that exploit various cross-sectional surveys from 1991 to 2018 (over 27 years), which to add to growing body of empirical literature in this area.

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Appendix: More Estimations

Table A1: Poverty Lines (TShs)

HBS Survey	Food Poverty Line (Tshs)	Basic Needs Poverty Line (Tshs)
1991/92	2083	2777
2000/01	5295	7253
2006/07	10219	13998
2011/12	26085	36482
2017/18	33748	49320

Notes: The table report poverty lines; food, and basic need poverty line in Tshs from 1991/91 to 2017/18.

Source: Various Tanzania Household Budget Survey (HBS) reports

Table A2: Consumption Model Synthetic Panel: Tanzania: 1991 - 2018

	(1)	(2)	(3)	(4)	(5)
	1991/92	2000/01	2006/07	2011/12	2017/18
Age in years	-0.04** (0.02)	-0.01 (0.01)	-0.00 (0.01)	-0.00 (0.01)	0.02** (0.01)
Age in years (squared) x 100	0.04* (0.00)	0.01 (0.00)	-0.00 (0.00)	-0.01 (0.00)	-0.03** (0.00)
Male	-0.01 (0.04)	-0.10*** (0.03)	-0.06*** (0.02)	0.02 (0.02)	0.02 (0.02)
Dependency ratio	-0.33*** (0.07)	-0.53*** (0.06)	-0.52*** (0.05)	-0.54*** (0.05)	-0.58*** (0.05)
Household size	-0.06*** (0.01)	-0.06*** (0.01)	-0.06*** (0.00)	-0.05*** (0.01)	-0.06*** (0.00)
Primary	0.17*** (0.04)	0.22*** (0.03)	0.20*** (0.03)	0.13*** (0.02)	0.15*** (0.02)
Secondary	0.40*** (0.07)	0.66*** (0.05)	0.62*** (0.04)	0.47*** (0.03)	0.56*** (0.03)
Higher Education	0.55*** (0.09)	0.81*** (0.10)	0.90*** (0.06)	0.89*** (0.05)	1.13*** (0.09)
Rural	-0.42*** (0.03)	-0.40*** (0.02)	-0.39*** (0.02)	-0.37*** (0.02)	-0.20*** (0.02)
<i>R-squared</i>	0.326	0.368	0.353	0.399	0.357
<i>Observations</i>	3802	16537	7885	7570	6460

Notes: Dependent variable is log of household consumption per capita. Standard errors are in parentheses. Household heads' ages are restricted to between 25 and 55 for the first survey round and adjusted accordingly with the year difference for the second survey round.

Source: Author's calculations based on Household Budget Survey (HBS) data.

Table A3: Non-Parametric Estimates of Extreme Poverty Joint Probabilities by Location: 1991 - 2018

	1991-2000	2000-2006	2006-2011	2011-2012
<i>Panel A: Rural</i>				
Poor, poor	7.74	3.85	5.18	5.18
Poor, non-poor	14.62	11.42	11.86	6.40
Non-poor, poor	8.44	12.61	5.75	5.56
Non-poor, non-poor	69.20	72.13	77.21	83.78
<i>Panel B: Urban</i>				
Poor, poor	2.22	1.09	1.09	1.09
Poor, non-poor	2.42	1.72	2.74	3.78
Non-poor, poor	1.51	3.17	3.54	3.87
Non-poor, non-poor	93.86	94.03	92.64	91.46

Notes: The table reports the non-parametric estimates of extreme (food) poverty mobility for two successive HBS surveys from 1991 to 2017. The rows give the fraction of households in the selected age range (25-65) that is in each of the four categories. For example, '*Poor, poor*' indicates the fraction that was poor in year t and remained poor in year t+1.

Source: Author's calculations based on Household Budget Survey (HBS) data.

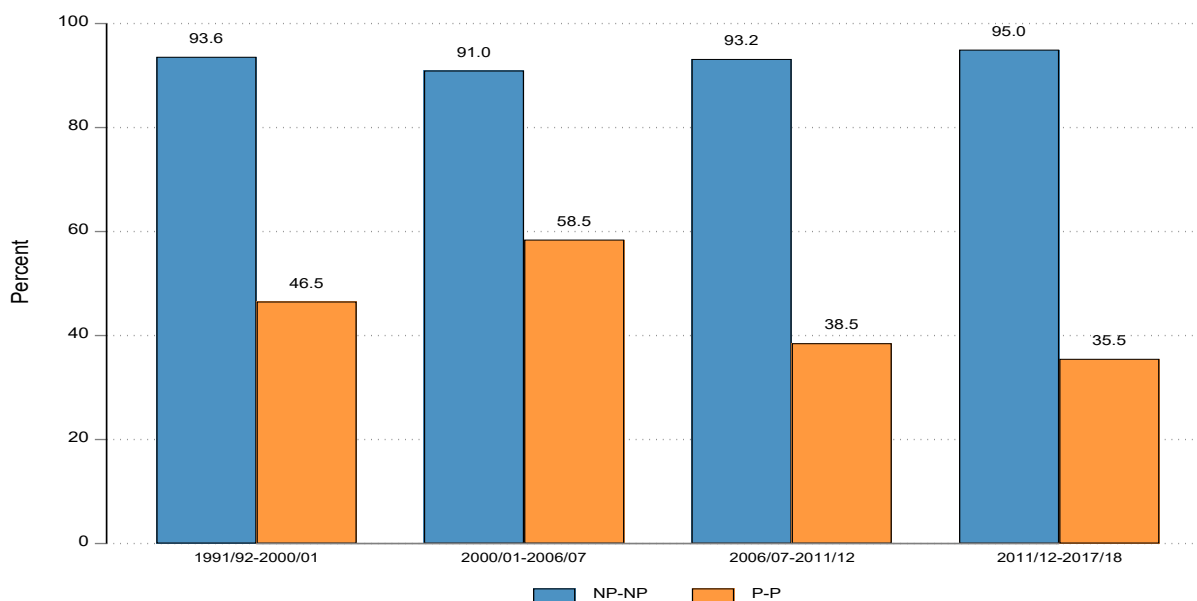
Table A4: Non-Parametric Estimates of Basic Poverty Joint Probabilities by Location: 1991 - 2018

	1991-2000	2000-2006	2006-2011	2011-2012
<i>Panel A: Rural</i>				
Poor, poor	19.17	12.94	16.27	16.27
Poor, non-poor	19.29	18.15	16.57	11.88
Non-poor, poor	12.93	19.70	11.82	11.08
Non-poor, non-poor	48.61	49.21	55.34	61.51
<i>Panel B: Urban</i>				
Poor, poor	6.40	3.66	3.89	3.89
Poor, non-poor	4.98	4.04	5.50	8.61
Non-poor, poor	3.26	6.51	8.33	9.22
Non-poor, non-poor	85.37	85.79	82.27	78.36

Notes: The table reports the non-parametric estimates of basic needs poverty mobility for two successive HBS surveys from 1991 to 2017. The rows give the fraction of households in the selected age range (25-65) that is in each of the four categories. For example, '*Poor, poor*' indicates the fraction that was poor in year t and remained poor in year t+1.

Source: Author's calculations based on Household Budget Survey (HBS) data.

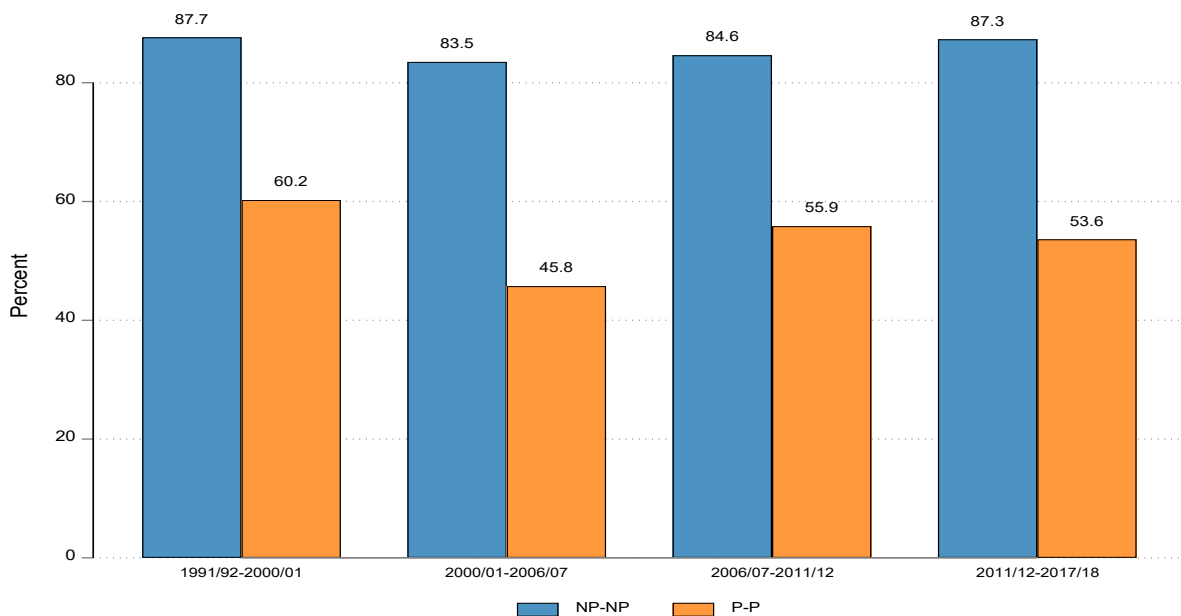
Figure A1: Non-Parametric Estimates of Extreme Poverty Conditional Immobility: 1991-2018



Notes: The figure plots the conditional (Extreme) poverty immobility from 1991/92 to 2017/18. P and NP denote poor and non-poor poverty status, respectively. NP-NP and P-P denote poverty immobility such that household that remains in their original poverty status, non-poor or poor in period $t+1$.

Source: Author's calculations based on Household Budget Survey (HBS) data.

Figure A2: Non-Parametric Estimates of Conditional (Basic) Poverty Immobility: 1991-2018



Notes: The figure plots the conditional (Basic) poverty immobility from 1991/92 to 2017/18. P and NP denote poor and non-poor poverty status, respectively. NP-NP and P-P denote poverty immobility such that household that remains in their original poverty status, non-poor or poor in period $t+1$.

Source: Author's calculations based on Household Budget Survey (HBS) data.