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**Combining quantitative and qualitative approaches to poverty dynamics
measurement and analysis:
the Rwandan case study**

Kirezi J. and Simons A.

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Abstract

This paper explores the differences between the qualitative life history interview approach and the quantitative expenditures approach to analysing poverty incidence and poverty dynamics. Based on a Rwandan case study in which 22 households were interviewed both quantitatively and qualitatively, we show that although the approaches are different in nature, they yield similar results in terms of categorising households as either poor or non-poor. When comparing poverty trajectories, we observe more differences, which can be explained by the proximity to the poverty line, differences in the treatment of assets, different period accounting for time inherent in one or the other method, and by the continuous nature of the quantitative variables compared to the discrete character of the qualitative indicators. When comparing well-being dynamics using the two methods, we find a positive correlation between expenditure growth and change in well-being, especially when the time period is long enough. In addition, we show that the extra knowledge gained from using a mix of both approaches more than compensates for any different results.

1. Introduction

The measurement and analysis of poverty has attracted a wide variety of research. Two main approaches – quantitative and qualitative – have been employed in this research, and increasingly these have been used in combination in ‘mixed methods’ or ‘Q-squared’ approaches. Various studies around the turn of the millennium (Carvayo and White, 1997; Chambers et al., 2001; White, 2002) advocated combining the two approaches to measuring and analysing poverty. The reason given for this is that both the quantitative and the qualitative methods have limitations when used on their own. Relying on one of them when measuring and analysing poverty is therefore less desirable than mixing the two techniques. Their complementarity lies in the fact that each method addresses different aspects and approaches different dimensions of poverty. They thus respond differently to similar, broad questions. Table 1 provides some key methodological differences between the two approaches. These include numerical versus non-numerical analysis, specific and general population coverage, and active versus passive involvement of the respondent population.

Table 1: Key differences between the qualitative and quantitative approaches

Dimension	Qualitative	Quantitative
Type of information on population	Non-numerical	Numerical
Type of population coverage	Specific	General
Type of population involvement	Active	Passive
Type of inference methodology	Inductive	Deductive
Type of disciplinary framework	Broad social sciences	Neo-classical economics

Source: Chambers et al. (2001).

Clearly, bringing both methods together can enrich the analysis and may result in more robust results. For this reason, the mixed-methods approach has been adopted in various poverty measurement and analysis studies (Bird and Shinyekwa, 2003; Howe and McKay, 2007, Lawson et al., 2007; Davis and Baulch, 2009).

While the literature has focused on the comparison of quantitative and qualitative methods in static poverty assessment, comparison of the two methods in dynamic poverty assessment, through longitudinal/panel data, has received little attention. One exception is a paper by Davis and Baulch (2009), which focuses on the differences in poverty trajectory identification using qualitative and quantitative methods with a two-wave panel for Bangladesh.

The current paper contributes to the scarce literature comparing methods in poverty dynamics analysis. First, we investigate differences and similarities in the evolution of well-being and in the characterisation of 22 poverty trajectories using a (qualitative) life histories approach and a (quantitative) panel expenditures approach. We base this part of the analysis on a set of households in Rwanda that were interviewed three times for their expenditures (in 2010/11, 2013/14 and 2016/7) and once for their life histories (in 2017). The period of analysis therefore covers 2011 to 2017. To do so, we systematically analyse the difference in poverty trajectories using the Life Histories qualitative approach and the expenditure quantitative approach. We categorise the results into 4 categories: The perfect match, the Long Term match, the Partial match and the No match. We then characterize the source of the differences using both approach.

In addition, we illustrate the different types of determinants identified through the panel expenditure approach, through the longitudinal life histories approach, and through the combination of both methods. This part of the analysis builds on the papers by Chabé-Ferret and Simons (2019), Bird et al. (2019) and

Shepherd (2019), which used a national representative panel dataset and more than 250 interviews – including life history interviews, key informant interviews and focus group discussions – to identify the determinants of poverty dynamics using each method and a combination of both.

The rest of the paper is structured as follows. Section 2 provides a short description of the dataset and the methodology. Section 3 compares the identification of poverty trajectories using the panel expenditure approach and the life histories approach. Before concluding, Section 4 illustrates the determinants of poverty dynamics obtained from each method and the combination of the two.

2. Methodology and Data

The analysis is in two stages. First, we look at the identification of poverty trajectories, and compare the trajectories obtained with the well-being categorisation (i.e. a qualitative categorisation) with the trajectories obtained with the panel expenditures categorisation. We then analyse the differences. Second, we analyse the determinants of poverty dynamics generated with each approach, as well as with the combination of both.

Identifying and comparing poverty trajectories

We first describe how a household is categorised as either poor or non-poor in each method and analyse how well the categorisations using each method correspond. We then compare trends in dynamic wealth ranking, which consists of a classification of well-being into six categories (see Bird et al. 2019), with trends in total expenditures. To do this, we compute the change in total expenditures from the Third Integrated Household Living Survey (EICV3, 2010/11) to EICV4 (2013/14), from EICV4 to EICV5 (2016/17), and from EICV3 to EICV5 (2010/11 – 2016/17). We also compute the change in expenditure for each category – i.e. housing, education, in-kind wage benefits, food, non-food, consumption from durables and transfers – from EICV3 to EICV4. Similarly, we compute the change in dynamic wealth ranking from the life history analysis for the dates that correspond to the three waves of the quantitative analysis. This allows us to generate the qualitative change in well-being over the following periods: 2010/11–2013/14, 2013/14–2016/17 and 2010/11–2016/17. To assess whether the expenditures approach and the life history approach yield similar trends in well-being, we run correlations between the change in expenditures and the change in dynamic wealth ranking for each possible pair of points in time. To avoid low changes in expenditure affecting the correlation, we only consider (positive or negative) changes of at least 10%; any changes of less than 10% are considered negligible and set at zero.¹ We also run correlations between expenditures per category and change in dynamic wealth ranking for the period 2010/11–2013/14 using the same method.

In addition, we compare the poverty trajectory of each household using the two methods and assess the incidences of similar and different results. We then analyse the types of mismatch in each method. To do this, we look at the cause of change in the qualitative data and examine how the expenditure (sub)categories have evolved up to that point in time.

The data used for this part of the analysis consists of quantitative interviews with 22 households over the three survey rounds, and the qualitative interviews in 2017. As the qualitative approach covers the period from 2010/11 to 2016/17, we have three different points of analysis (2010/11, 2013/14 and 2016/17) for which we have a dynamic wealth ranking, total expenditures and expenditures per category. More information on the data can be found in Chabé-Ferret and Simons (2019) and Bird et al. (2019).

¹ By construction, the dynamic wealth ranking varies less than expenditures, as there are six ranks versus a continuity of expenditure levels. As we are aiming to compare general trends, we want to avoid a low variation in expenditures affecting the correlation.

Comparing results: the determinants of poverty dynamics

In order to compare the determinants of poverty dynamics identified using the quantitative, qualitative and mixed approaches, we use the findings of the quantitative analysis by Chabé-Ferret and Simons (2019), the qualitative analysis by Bird et al. (2019) and the mixed-methods analysis by Shepherd (2019), all building on Rwandan data. We illustrate the main determinants identified through the different methods to show the value derived from using a combination of methods.

The data used for this part of the analysis consists of: (i) the three waves (2010/11, 2013/14 and 2016/17) of the national budget survey panel data covering around 1,800 households, to which the quantitative analysis applies econometric techniques in order to identify the determinants of poverty and poverty dynamics;² and (ii) life histories (a total of 230), key informant interviews (with local leaders and local development partners) and focus group discussions (gender-based and thematic-based) collected in 2017³ and 2019, on which the qualitative analysis builds to identify the determinants of poverty dynamics. The mixed analysis uses findings from both the qualitative and the quantitative analysis and provides additional findings based on further investigations, both on the qualitative and quantitative side, as a result of dynamic interactions between the two methods

2. Identifying poverty trajectories

2.1. Quantitative analysis: the expenditures approach

The expenditures approach is the most common approach taken in household budget surveys, and hence in poverty analysis. The aim of the approach is to analyse the welfare of whole populations, within which the categorisation of people as either poor or non-poor is possible. It also allows these two categories to be disaggregated into sub-categories, such as extreme poor. To do so, the total expenditure of households (or individuals) over a period is computed based on the consumption of items over this period. The information used for the computation is usually based on a questionnaire completed by either a household, the household head and/or various members of the household, or by individuals. The households/individuals interviewed can form a sample which is representative of the whole population, which is indeed the case for the Rwandan case study. From the information gathered by the completed questionnaires – which, in addition to consumption, usually cover other things such as household and individual characteristics, education, migration, housing, health, economic activity, assets, savings, and participation in government or other programmes – consumption is first computed by type of item (food consumption, non-food consumption, education expenditures, health expenditures, housing expenditures, etc.). These sub-categories are then aggregated into total consumption. If household (or individual) consumption is above the poverty line, that household (or individual) is categorised as non-poor; if consumption is under the poverty line, it is categorised as poor. The Rwandan poverty line is computed using two tiers. First, the value of a food basket that provides about 2,500 Kcal per day per adult equivalent (the extreme poverty line) is determined. To this is added a provision for non-food consumption (for 40% of non-food consumption). This results in a poverty line of 159,375 Rwf per adult equivalent.

² For more information on the methodology used, see Chabé-Ferret and Simons (2019).

³ We note that the households visited in 2017 form part of the panel data.

Poverty trajectories are then obtained by combining the successive poverty categorisations. In the case of a three-wave panel, since we have two possible status at each point in time – poor (P) or non-poor (N) – we have eight possible poverty trajectories (PPP, PPN, PNP, PNN, NPP, NPN, NPP, NNP, NNN). **Table 2** provides definitions of the different poverty trajectories.

Table 2: Definitions of poverty trajectories

Definition	Trajectory of the course of a three-wave panel (P= poor; N= non-poor)
Chronic poverty is poverty that is experienced over many years, and often over a lifetime. Chronically poor individuals and households commonly pass on their state of poverty to their offspring, resulting in its intergenerational transmission.	PPP (poor in wave 1, wave 2 and wave 3): households that were poor in every survey period.
Impoverishment refers to the process whereby a poor person or household becomes poorer, or where somebody who is non-poor slips into poverty.	NPP, NNP: households that began the survey period non-poor, but at some stage fell under the poverty line and remained in poverty for the remaining survey rounds.
Transitory poverty escapes refer to individuals or households that used to live in poverty, succeeded in escaping poverty, and then subsequently fell back into poverty (i.e. they became re-impooverished).	PNP: households that were initially poor, subsequently escaped poverty, but fell back into poverty by the end of the survey period.
Sustained poverty escapes , for the purposes of this work, are viewed as a set of capacities enabling households to remain out of poverty over the long term, even in the face of shocks and stresses. In other words, the capacity to be resilient means an individual or household is ultimately able to avoid becoming impoverished or experiencing only a transitory escape from poverty.	PNN: households that were under the poverty line in initial survey rounds, but crossed the threshold in at least the last two periods.

An expenditures approach is usually preferred to an income approach in poverty analysis for a number of reasons. The main reason is that, although consumption data can be more difficult to collect than income data, theoretically consumption is a more satisfactory measure of well-being and it is also less variable than income over the period of a year (in particular, in economies where a large part of the population is involved in agriculture and income is seasonal; see Deaton et al., 1999).

However, the expenditures approach also has its weaknesses. It aims to evaluate standard of living, but it focuses on a single aspect, namely, the economic aspect. It thus leaves out of the analysis many other aspects of quality of life, such as satisfaction with service delivery, access to justice, access to and level of education, health status, and so on. Some of these dimensions of standard of living can be captured by methods such as multidimensional poverty analysis and qualitative analysis, among others.

Table 3 describes how the levels of expenditures are computed for the case of Rwanda. We note that this method is standard and follows Deaton and Zaidi (1999). It is also worth noting that the poverty status of a household is assessed exclusively against these criteria. For a poor household, an increase in expenditure (at constant prices) on any of these categories will lead to a decrease in distance from the poverty line (and hence to a reduction in poverty severity), or to a change in status to non-poor if the increase is such that the household's total expenditure rises above the poverty line. Higher expenditure on education, housing and health are all associated with less poverty. Note that this approach is based on (a subset of) what a household consumes, and not what it can afford.

Table 3: Contents of household consumption aggregates

Component	Description of contents and items covered
Education expenses	Including Registration and school fees, parents contribution, school uniforms, transport to school, room and board, other expenditure such as field trips, insurance etc.
Housing expenditures	Including actual rent, imputed rental value of owner-occupied dwellings (respondent - provided valuation), rent in cash and in-kind, water and electricity expenses
Wage income	Payments received by employees in kind, subsidized houses by employer and other benefits
Non-food expenses	Value of infrequent non-food items purchased in the past year, but excluding purchases on durable goods and items already reported elsewhere. This includes items of clothing, personal belongings, housing, household furnishing & appliances, transport, leisure and recreation, health, other services. Value of more frequently purchased non-food items: based on purchases in last month. This includes items of Domestic and hygiene products, transport, leisure and culture, personal care, communication, other services to the household, basic prevention & medicine & medical consultation. Value of frequent purchased non-food items. This includes items of leisure and culture, hygiene and cleaning, transport, energy and material for cooking and lighting, repairs, communication, other expenditure.
Food expenditure	Purchase of all food items
Own food consumption expenditure	Consumption (value) of own-produced food items
Transfers	Transfers (value) received from other individuals or households paid in kind (food or non-food)
Use value of durable goods	Estimated consumption flows value derived from durable goods (based on current value and estimated depreciation rate)

Source: NISR Rwanda poverty profile EICV4 and EICV4 survey questionnaire.

2.2. Trends in expenditure in Rwanda

To see how the evolution of expenditure may impact poverty, we now move to the trends in expenditure by category in Rwanda over the period 2010/11 to 2016/17.

Table 4: Expenditure categories (EICV3-4-5 cross sections – Full datasets)

All population								EICV3-5 Variation
Variables	EICV3		EICV4		EICV5			
	Amount	%	Amount	%	Amount	%		
Housing expenditures	29,512	11%	34,911	12%	31,215	11%	(+)	
Education expenditures	12,458	5%	11,625	4%	11,829	4%	(-)	
Wage benefits	12,761	5%	11,291	4%	8,102	3%	(-)	

Food expenditures	78,936	30%	89,863	32%	110,306	40%	(+++)
Own food expenditures	50,544	19%	50,826	18%	37,551	13%	(--)
Non-food expenditures	62,516	24%	66,779	24%	62,113	22%	()
Expenditures from durables	11,029	4%	9,862	3%	10,482	4%	()
Transfers expenditures	7,465	3%	7,167	3%	7,228	3%	(-)
		100		100		100	
Total expenditures	265,221	%	282,323	%	278,827	%	(+)
Poor							
							EICV3-5 Variatio n
Variables	EICV3		EICV4		EICV5		
	Amount	%	Amount	%	Amount	%	
Housing expenditures	8,686	8%	9,454	9%	7,483	7%	(-)
Education expenditures	2,729	3%	2,662	2%	1,957	2%	(-)
Wage benefits	1,359	1%	1,117	1%	1,198	1%	(-)
Food expenditures	34,924	33%	39,418	36%	51,860	47%	(+++)
Own food expenditures	35,487	33%	35,706	32%	24,441	22%	(--)
Non-food expenditures	17,856	17%	17,656	16%	19,318	17%	(+)
Expenditures from durables	1,109	1%	541	0%	418	0%	(-)
Transfers expenditures	4,210	4%	3,746	3%	3,765	3%	(-)
		100		100		100	
Total expenditures	106,359	%	110,299	%	110,440	%	(+)

Error! Reference source not found. Table 4 shows the trends in mean aggregate expenditures over the period 2010/11 to 2016/17. First, we note that the mean total expenditure of the population increased over the period, although it decreased over the more recent period of 2013/14 to 2016/17. The increase in households' total consumption (+5.1% over the period, on average) was driven by (i) an upward trend in some expenditure categories, and (ii) a redistribution of expenditures across categories over the period. Housing expenditures were largely constant in the three waves, accounting for about 11% of total expenditures. Education was also constant at around 4% of total expenditures. Expenditures from durables and non-food expenditures did not change significantly, remaining at about 22% and 3% of total expenditures, respectively. Wage benefits decreased slightly over the period. The increase in total expenditures was thus driven by the increase in food expenditures, which were actually higher, in absolute terms, than the increase in total expenditures. This implies that we have seen a redistribution of expenditures from non-food categories to food categories. In addition, when we look at food expenditures, we note that purchased food expenditures increased sharply, while own (produced) food expenditures decreased. This trend is also observed when we restrict the analysis to the poor. In brief, the increase in mean total expenditures in Rwandan households was driven by an increase in purchased food expenditures which exceeded the increase in total expenditures, suggesting a redistribution of expenditures towards food consumption.

In terms of poverty, this analysis of expenditures could indicate that, at the aggregate level, the factors that have a large impact on poverty reduction in Rwanda are those driving expenditures on purchased food.

3. Qualitative analysis: the dynamic wealth ranking approach

Qualitative research is known to provide information on reported facts, opinions and behaviours of the subjects, based on broad answers from specific interviews and responses to open-ended questions (from a pre-designed checklist). It gathers this information from various types of sources, such as household members, key informants (heads of district, entrepreneurs, etc.) or groups of people that share characteristics (youth, women, etc.). Several techniques are commonly used to collect qualitative information, including ethnographies, case studies, personal interviews, focus groups and life history interviews ([Abubakar, Bakar et al. 2008](#)).

This paper focuses on life history interviews undertaken in Rwanda. These took the form of a more or less open-ended interview aiming to capture information on the stories, facts, inner lives, moral struggles and successes, and perceptions of the world around the respondents ([Bryman, 2016](#)). In conducting poverty analysis, life histories aim to capture life cycle patterns and to help in understanding complex causation as well as different periods in individuals' lives. Focus group discussions and key informant interviews can help to contextualise the life histories within an understanding of change at the community and national levels ([Davis, 2006](#)). Life histories identify periods of improvement, times which have been tough, and periods where not much has really changed. They help to answer questions such as: Why did peoples' situation deteriorate? How did it get better? How, despite illness, drought or some other shocks, did they manage to protect their situation? (See Bird et al., 2019)

Life history interviews categorise well-being at a point in time as well as changes in well-being over time. To do so, a 'universal well-being scheme' has been created. Using such a scheme enables comparisons to be made across communities and even across countries by using the same criteria. The underlying idea is that providing clear criteria for categorisation is a tool to better understand the well-being distribution of households and dynamics of poverty. The universal well-being scheme separates the well-being of households into either 'poor' or 'non-poor', with three categories of poor ('destitute', 'very poor', 'poor') and three categories of non-poor ('vulnerable but not poor', 'resilient non-poor', 'rich').

To understand poverty, a multi-dimensional approach is used and households are assigned a category based on their endowments, relationships and characteristics.

- i. Endowments include labour/work capability, health, education, ownership or access to productive assets, financial assets, access to environmental capital (e.g. communal land, water, forest resources).
- ii. Institutional relationships include family, social, economic and political relationships that shape levels of poverty (vulnerability) and of wealth (resilience/sustainability of escapes).
- iii. These levels of well-being are additionally defined by key outcome characteristics, such as savings capacity, food quantity and quality, security of consumption over the year, quality of housing, clothing and so on.

Groups 1 to 3 have low levels of endowments (or negative endowments and liabilities such as debt, ill-health and caring responsibilities) as well as poor institutional relationships (exploitation, exclusion from or adverse inclusion in families, markets and social and political institutions). Groups 4 to 6 have relatively higher levels of positive endowments and positive economic social and political relationships which, together, form the foundation of sustainability or resilience.

Life history interviews are collected at the household level, with researchers selecting households based on their trajectories. Households are identified from the panel dataset if possible, or from a group of

knowledgeable people at the village level (i.e. the village leader and village council).⁴ Where possible, an adult male and an adult female are interviewed, including the head of the household. Where the household does not contain an adult man and woman, a person of the missing gender will be interviewed from a household of the same wealth status. All trajectories are considered; by also talking to the non-poor, the researcher hopes to identify some of the advantages which protected from falling into poverty and to demonstrate how the experiences of the severely and persistently poor differed from those of the transitorily poor, and so on. Starting from a semi-structured questionnaire, participants are invited to talk about their lives. By doing so, we hope to identify path-determination in individuals' lives and to pinpoint key moments of choice – or absence of choice. The life history interviews allow us to look at change over time. Covering long time periods helps in understanding why things happened and enables the analyst to focus on a specific time period, from earliest childhood to the present day, including key life-changing events. More specifically, the life periods considered are childhood and adolescence (ages 0–18), young adulthood (marriage/start of own household or ages 20–40), late adulthood (ages 40–60) and old age (ages 60 years and over).⁵

The end product of a life history is thus captured as a biography, with reported facts and perceptions which play an important role in subjective well-being (people have different life purposes, and a person's evaluation of well-being is contingent on their life purposes; see [Rojas, 2004](#)). Information collected through the life history interviews also allows us to capture the trajectories followed by individuals and their households as they decline into poverty or move out of it. It also enables us to identify the most common covariant and idiosyncratic shocks which trigger a decline into poverty ('drivers') and the constraints which prevented accumulation, investment and the movement out of poverty ('maintainers') ([Bird and Shinyekwa, 2003](#)).

4. Comparing poverty trajectories

We start by comparing the poverty categories of households using the expenditures approach and the life history (LIFE HISTORY) approach (see [Table 5](#)). Our dataset consists of 22 households for which we have three data points that can be compared (quantitative versus qualitative). We find that the two approaches yield the same result in 47 out of 66 cases. It is worth noting that the second wave recorded almost double the mismatches of the two others (13 vs 5). Looking at the cases where we do not observe a match – that is, when a household is categorised as poor using one method and non-poor using the other – the results show that in 15 out of 19 cases, the expenditures approach categorises a household as poor while the life history approach categorises it as non-poor. However, we note that, except for one isolated case, the qualitative method places households in the category just above or just below the poverty line. This is in contrast to the expenditures approach, with some households classified as non-poor in the qualitative analysis but far below the poverty line in the quantitative analysis.

Table 5: Matching of qualitative categorisation to quantitative categorisation (by poverty status and year)

	2010/11		2013/14		2016/17	
	Match quantitative	Do not match	Match quantitative	Do not match	Match quantitative	Do not match
Poor	12	1	9	2	10	2

⁴ This part of the analysis uses households identified through the panel dataset.

⁵ Of course, not all periods will be relevant to every participant.

Non-poor	5	4	4	7	7	3
Total	17	5	13	9	17	5

As we are mainly interested in the dynamics of poverty, we then move to a comparison of the categorisation by poverty trajectory using both approaches. *Table 6* presents the identified trajectories using both methods. We categorise the results of the comparison into 4: (i) perfect match, that is, the qualitative and quantitative categorisation yield the same results; (ii) long-term match, that is, the qualitative and quantitative categorisation yield the same results in the first and last period; (iii) partial match, that is, the qualitative and the quantitative yield the same results in either the first two waves or/and the last two waves; and (iv) no match, that is, the qualitative and quantitative categorisation yield different results for 2 waves or more. It is worth noting that out of 22 observations, we have 9 perfect matches, 14 long-term matches, 17 partial matches and 5 no matches. There is of course an overlap among these categories. We now describe the results in each category.

Table 6: Comparing poverty trajectory categorisations

#	Qualitative	Quantitative
1	NNN	PPN
2	NNN	NNP
3	NNN	PNN
4	NNN	NPN
5	NNN	PPN
6	NNN	NNN
7	NNN	NNN
8	NNN	PPP
9	NNP	NPP
10	PNN	PPP
11	PNN	PPN
12	PPP	PPP
13	PPP	PNP
14	PPP	PPN
15	PPP	PPP
16	PPP	NPN
17	PPP	PPP
18	PPP	PPP
19	PPP	PNP
20	PPP	PPP
21	PPP	PPP
22	PPP	PPP

Perfect matches

Out of the 22 poverty trajectories, 9 yield similar results. The 9 trajectories are flat, that is either never poor (2) or chronic poor (7).

The typical trajectories are illustrated by Figure 1 (Never poor) and Figure 2 (Chronic poor). While the match in terms of trajectory is perfect, we note some differences in well-being trends, which is not surprising given the methods to assess the trajectories are different. The expenditure approach yields more variation than the dynamic wealth ranking approach. By construction, the expenditure is a continuous variable, which can record small variations, while the dynamic wealth ranking approach is discrete and takes 6 values, hence a change in rank follows major changes in life and varies less than the expenditure.

In addition, households in the perfect match category are usually not close to the poverty line if we consider the expenditure approach (usually more than 20% away from the poverty line) but more often in category 3, when we look at the dynamic wealth ranking. The chronic poor are in most of the cases in extreme poverty (expenditure), while their dynamic wealth ranking category varies from 1 to 3: this may reflect that the qualitative approach goes deeper into the variation at the bottom of the distribution.

Slightly different results may depend on the type of events recorded by each method. The two approaches may capture similar events. For example, a life history captured that a household “sold land to buy [another] land in swamp area. He cultivated rice but the produce was only for home consumption” and the household moved from wealth ranking category 3 to category 3+. Similarly, the expenditure approach reported an increase in the household’s own food consumption, which was counterbalanced by a partial decrease in purchased food; but on average, expenditure rose, mirroring the finding from the qualitative. Similarly, another life history captured that a household “bought a plot and built a house. The wife got a job”, and the household is at well-being rank 6. Similarly, we observe an increase in total expenditure, originating from a large increase in housing expenditures (imputed rent) and in food expenditure.

One approach may also capture changes which are not reflected in the other. This includes a small variation in expenditure not reflected in changes in the well-being rank. An example is a slight (but significant) reduction of the transfers received for a household above the extreme poverty line or an increase in own food expenditure of a household in extreme poverty.

On aggregate, among the 9 perfect matches we observe very similar flat trends for 5 households, oscillations for 3 households, and a slow downward trend in the quantitative versus a flat trend in the qualitative for 1 household.

Figure 1: Perfect match, Never poor

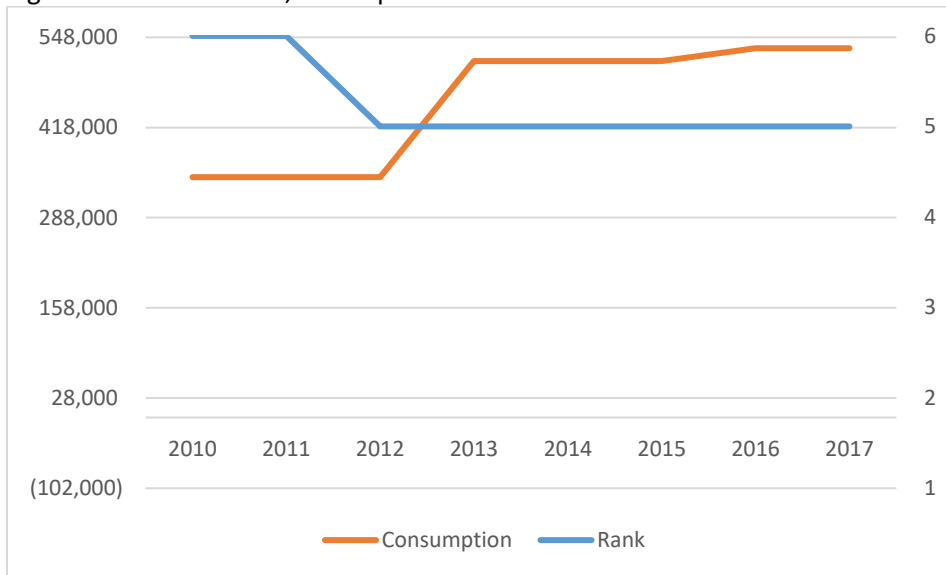
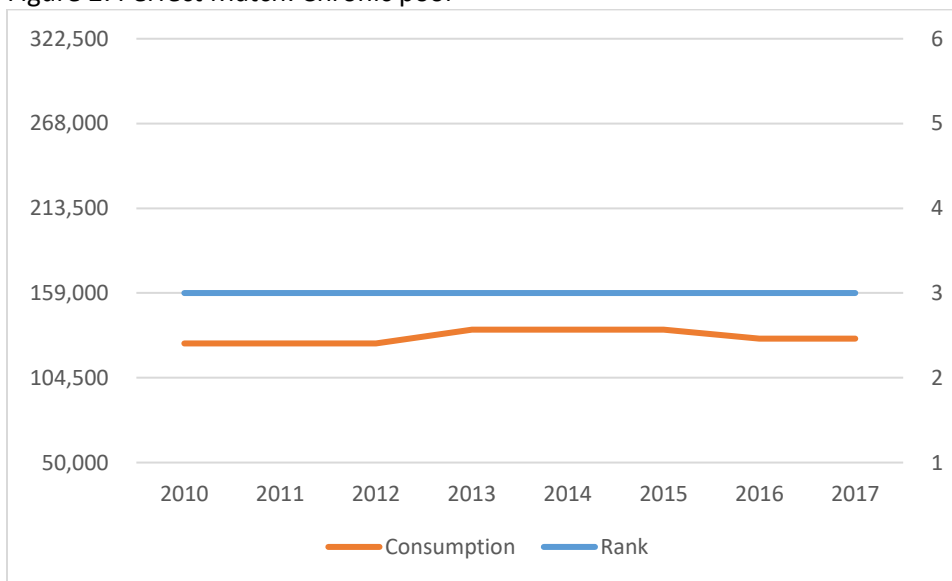


Figure 2: Perfect Match: Chronic poor



Long term matches

Out of the 22 poverty trajectories, 14 yield a match between the first and last period, which was labelled “Long term match” and which corresponds to a match at the beginning and at the end of a period of 6 years. Among the 14 long term matches, 9 are the perfect matches discussed above. Here is an analysis of the 5 additional long term matches whose categorisation as poor or non-poor varies in the middle year. This category is made of never poor, impoverished, escapers and chronic poor.

There are two types of differences within this group. The first one relates to the timing of the change, which can be early or late. That is, we have late impoverishment (impoverishment in the last year), versus early impoverishment (impoverishment in the middle year). Similarly we have sustained escapes, versus late escapes. The latter scenario is illustrated in Figure 3. In this case, we observe three factors leading to a mismatch in the identification of the timing of change. First, the household is close to the poverty line,

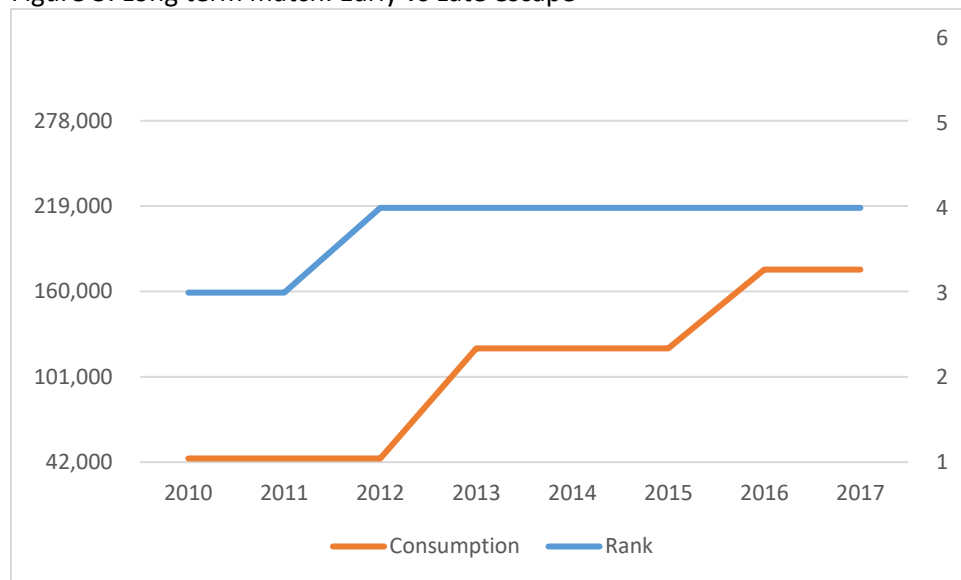
both on the side of expenditure and on the well-being category. The classification hence depends on the exact location of the poverty line. The narrow expenditure approach, which takes into account a more limited number of factors, may hence yield different results than the more multi-dimensional qualitative approach, which takes into account a wider range of factors.

Second, the expenditure approach considers expenditure over one year, which is usually spread over two years. Similarly, the qualitative assessment has to define a specific date/year for the change of category, which might yield a different result, as different indicators figure in the analysis. A household case illustrates this issue well: A household experienced 3 consecutive years of drought, which has resulted in (i) a reduction of own food consumption in the expenditure analysis inducing impoverishment, and (ii) difficulty of finding employment in the qualitative, which also led to impoverishment, but with a lag on the qualitative side. The match ends being a long term match and not a perfect match because different factors have featured in the change. It is also possible that a shock resulting in a change in dynamic wealth rank could affect consumption with a significant lag, provided the household is able to absorb the shock for a certain period.

A third case is where the trend is similar, but the initial position, although similar in terms of poverty status, is somehow different. The level of expenditure is low and the well-being rank is higher (or conversely). A similar trend may hence result in different categorisation, but eventually results in a different poverty trajectory (See Figure 3).

We learn from the above that results comparing the timing of a change in poverty status should be taken with caution when we have longitudinal/panel analysis over a limited number of waves (as it is still the case for most developing countries). More emphasis should be on the analysis of trends.

Figure 3: Long term match: Early vs Late escape



The second type of long term match relates to transitory versus permanent (or flat) status, that is, temporary impoverishment versus never poor, and transitory escapes versus chronic poor. Illustrations are provided in Figure 4 and Figure 5. Typically, these households are not too far from the poverty line and when they experience a shock (in these cases a positive or negative expenditures shock), they cross the poverty line before going back to their previous status. A notable illustration of this is a household's

“harvest decline because of land infertility” recorded in the life history. However, given that they still harvest, and continue to have other resources, they “stay in category 4”. By contrast, the decrease in the household’s own food consumption (which comes from the poor harvest) resulted in a decrease in total expenditure in the survey, which was just enough to cross the poverty line and categorise the household as poor, a situation that changed back to the previous status (non-poor) in the next assessment.

Another illustration is a temporary increase in well-being, which is not sustained enough to be translated in an increase in well-being category. An example is a households “continuing to cultivate tea, maize etc. because it was done on small land, it couldn’t help them improve on well being” and which stayed at level 3, while on the expenditure categorisations, we recorded an increase in food consumption, followed by an immediate decrease of food consumption in the following period, hence yielding a transitory escape.

Figure 4: Long term match: Transitory impoverishment

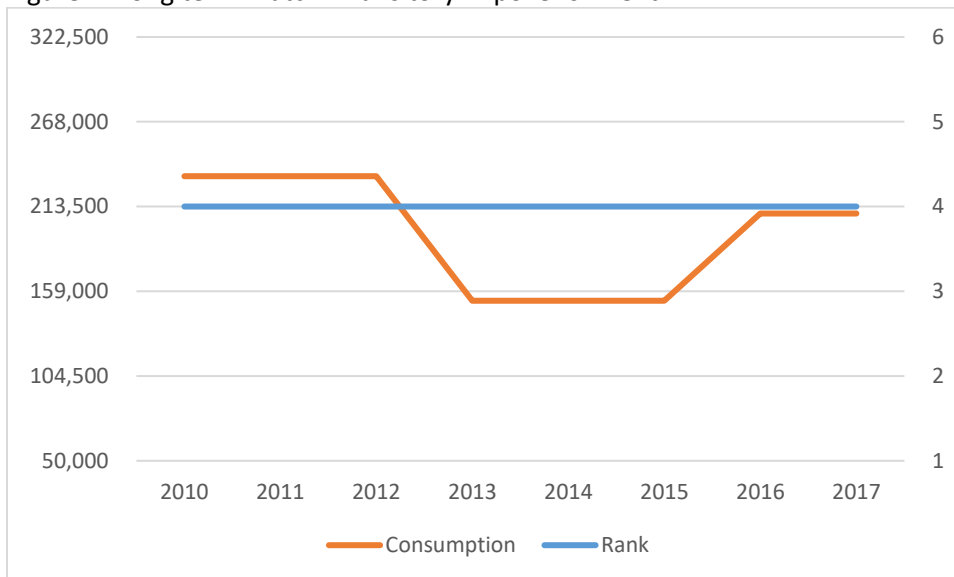
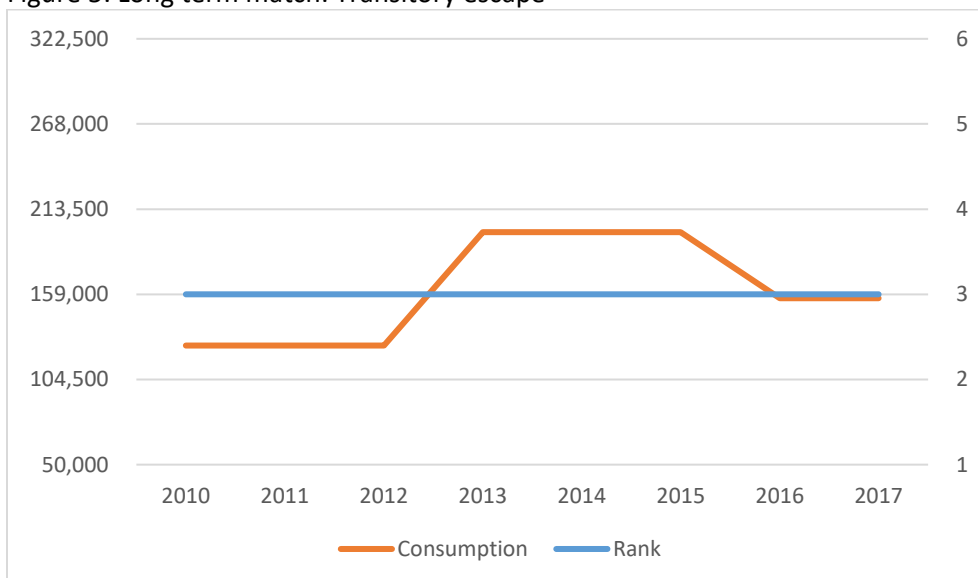


Figure 5: Long term match: Transitory escape

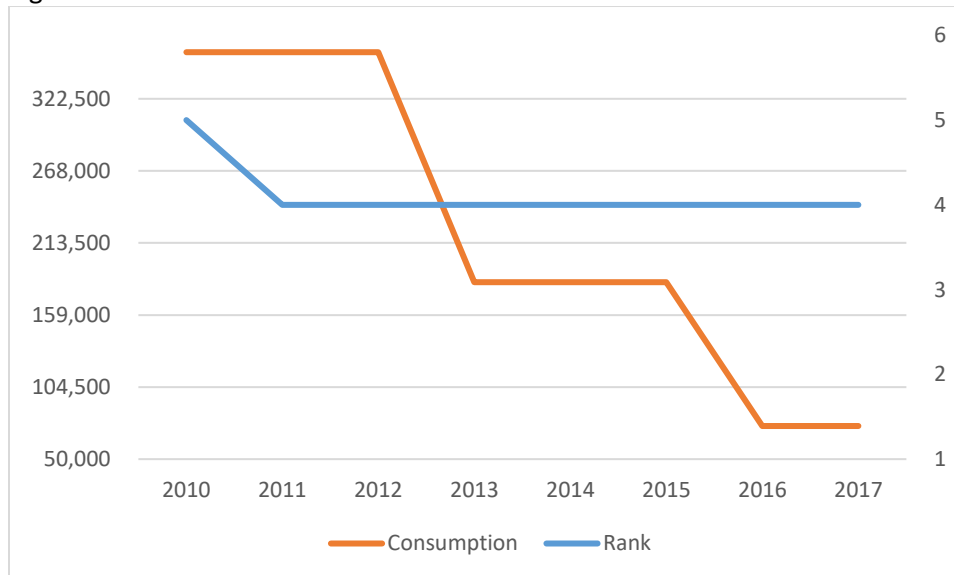


Partial matches

Out of the 22 poverty trajectories, 17 yield a match between at least 2 out of the three waves. However, among these 17 cases, 14 are long term matches, leaving 3 partial matches. In these cases it is either the initial categorisation or the final categorisation which is different.

Where there is a difference in the final status, we have a never-poor household using the dynamic wealth ranking, which has become impoverished according to the expenditure approach, and a chronic poor household in the life history approach, which is a late escaper in the expenditure-based approach. In the former case, which we describe here, we observe a similar downward trend using the two methods (Figure 6). What is different is the intensity of the downward trend, which is much more pronounced in the expenditure approach than for the dynamic wealth ranking approach. The life history describes a succession of positive and negative shocks for this household, and the subject “stopped trading because it was a tough job”, before he “married” and “left fishing”, then “he rented a land where he would harvest” before he “got sick” and “was surviving by burning charcoal” but “joined a [self-] help group from where he hopes to get a sufficient amount to start a business”. This sequence of events has affected his food and non-food expenditure in such a way that total expenditure has dropped. However, there is still “hope” for the future, based on access to social capital (the self-help group) which could explain why the household was not yet categorised as poor. However, we can easily anticipate that, if there is no improvement in the next period, the qualitative categorisation will categorise this household as poor, hence being similar than the expenditure approach.

Figure 6: Partial match



In the case of a different initial categorisation, we cannot trace if this initial difference was persisting in the past, as we do not have expenditure data. As a result, the comparison can be based (i) on a static approach of the two approaches for the first wave (initial difference) or (ii) on a dynamic approach using the qualitative analysis only or (iii) both.

As an example, the dynamics using only the qualitative approach (LH) tells us that a household “had a cow” and “After the cow had well grown, it was stolen with her baby cow”. However this household would “harvest and got seeds to cultivate avocado” and the households well-being rank remained unchanged. Here, we might spot a potential event: “the theft of the cow”, which could induce temporary different

poverty trajectories, as it is likely that the theft of the cow has affected the expenditure pattern of the household. However, we are only able to look at the level of expenditure after the cow was stolen, and we can also look at the next level of expenditure. We see that the level of food and non-food expenditure was low in the initial period (after the theft), and that it increased sharply in the next period, which could explain a transitory impoverishment in the expenditure approach, as it is similar to what we observed in the long term matches.

No matches

The last category is the no match category, whereby the two approaches yield different results in 2 out of the three waves, that is differences both in terms of poverty status and trajectories, and (possibly) dynamics. Out of the 22 poverty trajectories, we have 5 no matches. All except one of the no match cases are flat trajectories as recorded in the qualitative method. In the qualitative approach there 3 never poor (NNN), one sustained escape (PNN) and one chronic poor (PPP).⁶ In the expenditure approach, they are categorised as chronic poor or late escapers.⁷ We note that only one trajectory is totally different in the qualitative and in the quantitative (respectively NNN and PPP).

The no match cases are usually due to a combination of factors. For example, the difference in dynamics illustrated in Figure 7 comes from a combination of continuous improvements in housing in the qualitative, which is translated into an escape, but with a lag, in the quantitative. The household's expenditure level was very close to the poverty line, and in the qualitative assessment also close to it, but on the other side. The final categorisation was identical.

Another example includes an initial expenditure level close to the poverty line follow by an investment in an asset reported in the qualitative, and a simultaneous decrease in the non-food expenditure in the expenditure analysis, which could be a corollary of the investment.

A further combination of factors leading to a no match is illustrated in Figure 8, where the qualitative method reports an investment in housing made possible following an inheritance, which was not immediately captured in the expenditure analysis except possibly through a decrease in non-food expenditure. Further investment in livestock in the next period, reported in the qualitative analysis, may be reflected by a further decrease in food expenditure in the quantitative. The combination of both these successive decisions and events may lead to a medium term discrepancy in the identification of poverty trajectories, which may eventually converge in the next categorisation(s).

⁶ Note that sustained escape is very close to the never poor trajectory for the case where the first wave is close to the poverty line, which is the case here.

⁷ We have 2 late escapers (PPN), two chronic poor (PPP) and one temporary impoverished (NPN).

Figure 7: Never Poor vs Late impoverishment

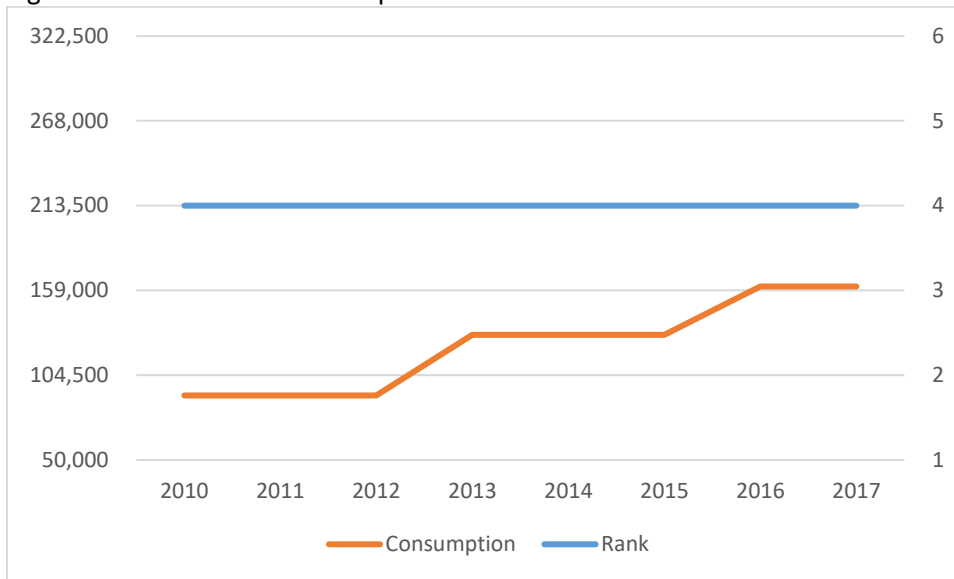
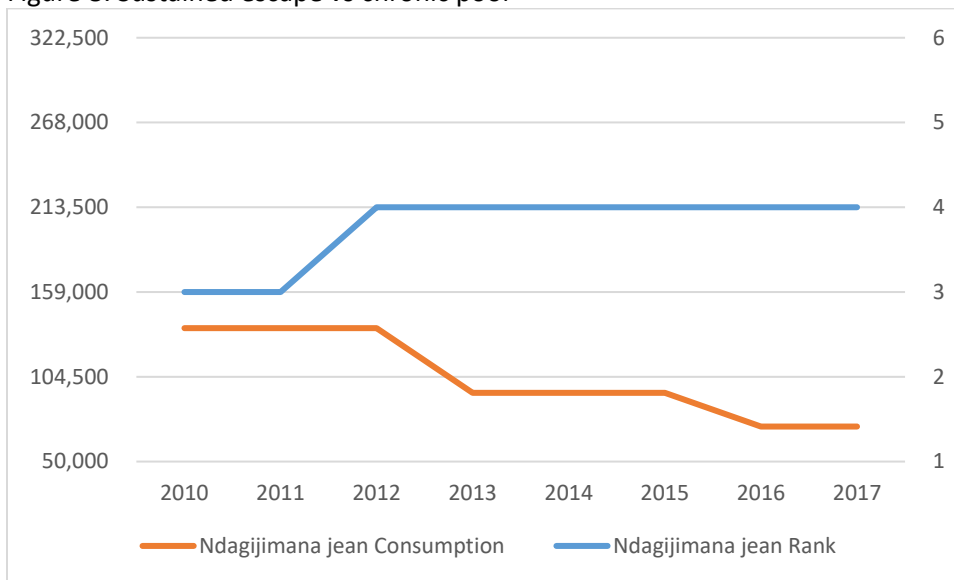


Figure 8: Sustained escape vs chronic poor



From the four categories of comparisons developed here, perfect match, long term match, partial match and no match, we were able to identify key sources of the differences in poverty trajectories using both approaches. They are: first, the closeness to the poverty line, which may result in similar assessments but assignment of different categories. Second, successive small changes taken into account by the expenditures approach may lead to different trends. Third, the identification of the exact time of change may differ in both methods leading to different transitory patterns, because different indicators feature in the assessment at a given moment in time. (The qualitative research would not be able to replicate the consumption.) Fourth, there are some lags in how some events, especially investments in assets, are revealed in both methods. And fifth, some temporary changes in expenditure may not feature in the qualitative record.

Some more analysis

We complement the previous analysis by an aggregate comparison of trends in well-being categories using both methods. To do this, we compare the evolution of dynamic wealth ranking with the growth of expenditures.⁸ Table 7 provides the correlation between the evolution of dynamic wealth ranking and expenditure growth over the three periods that we are able to study – that is, the first and second periods (2010/11–2013/14 and 2013/14–2016/17, respectively) and the overall period (2010/11–2016/17). Although the correlation is positive, as expected, the link is weak for the short periods and stronger for the longer period (i.e. 2010/11–2016/17). It is worth noting that the overall correlation of expenditure levels and dynamic wealth ranking (over the three years) is similar to the one of trends over the longer period, with a coefficient of 0.49 for both. This means that wellbeing trends become more similar the longer the period considered.

Table 7: Correlation of well-being categorisation by well-being rank and expenditures

		Dynamic wealth rank growth		
		2010/11-2013/14	2013/14-2016/17	2010/11-2016/17
Expenditures growth	2010/11-2013/14	0.2748		
	2013/14-2016/17		0.1535	
	2010/11-2016/17			0.4982

Finally, correlations were also run between dynamic wealth ranking and the various categories of expenditure – housing, education, food, own-food, non-food, durable goods and transfers. With the exception of food (coefficient 0.32), we do not find strong correlations.⁹

5. The determinants of poverty trajectories

We now move from the identification of poverty trajectories to the identification of the determinants of poverty dynamics. As previously described, the quantitative and qualitative methods each have their own approaches and identify their own factors determining poverty trajectories. Including the results derived exclusively by the quantitative analysis and those derived exclusively from the qualitative analysis in the same analysis ensures an improved understanding of poverty dynamics. In addition, some results can be derived by both the qualitative and the quantitative analysis, and by having the research approaches talk to one other, the analysis can be built in a dynamic way and further areas can be explored. This allows us to reach a final result that is a better description of the reality. The following subsections provide examples of the contribution of results derived exclusively from the quantitative analysis, results derived exclusively from the qualitative analysis and the mutual results from the Q2 analysis. Additional illustrations of the subject study can be found in Chabé-Ferret and Simons (2019), Bird et al. (2019) and Shepherd (2019), respectively.

⁸ Changes in expenditure are considered only if they are greater than 10% (positive or negative).

⁹ Note that we only have 22 observation as, at the time of writing, the data was available only for the period 2010/11-2013/14. A future version of the paper will include 2017 data.

Creating the aggregate picture through quantitative analysis

One key strength of the quantitative analysis, and an advantage over the qualitative analysis, is that it is able to generate aggregate results that are representative of a population and which can provide correlations between the outcome variable and a series of factors. In some cases, it may be possible to isolate the effect of a factor, keeping the others constant.

In this section, we illustrate the findings derived from the quantitative analysis of Chabé-Ferret and Simons (2019) used to analyse poverty dynamics in the case of Rwanda. The authors use a panel dataset to study the dynamics of poverty – rates of poverty escape, impoverishment, chronic poverty, etc. – at the national and province levels, as the panel dataset used is representative at these levels. They then identify the significant factors associated with being poor or not using a random-effects (and fixed-effects) logit model where poverty status in a given year is the dependent variable and household characteristics are the explanatory variables. The added value of this analysis is that it focuses on the variation of the variables (random effects), hence explaining movements in and out of poverty, and it controls for any (observed or unobserved) time-invariant household characteristics (fixed effects).

The authors then analyse poverty trajectories. Using a multinomial logit model, they explore the determinants of sustained poverty escapes as compared to transitory escapers and chronic poverty. Similarly, they explore the factors that prevent impoverishment by comparing the never-poor trajectory to impoverishment and transient impoverishment. They thus explain household poverty trajectories using two types of variables: household characteristics and shocks.

The added value of the results from this quantitative analysis of dynamics is threefold. First, they show the aggregate figures for impoverishment and escapes out of poverty in Rwanda, at the national level and at the province level. We can thus see that the slowdown in poverty reduction was driven by a decrease in the rate of poverty escapes and an increase in the impoverishment rate. We are also able to see that the decrease in escapes was driven by the Southern and the Northern Provinces, while the increase in impoverishment was driven by the Southern and Western Provinces. We also learn from this analysis that the city of Kigali is different from the rest of the country, especially in the last period when rate of poverty escapes increased and the impoverishment rate decreased sharply.

Second, the analysis identifies significant determinants of poverty (see Table 8). We hence learn, among other things, the following:

- (i) Education is strongly linked to non-poverty. Completing primary education alone halves the probability of being poor, while reaching secondary or higher education virtually eliminates all risk consistently across all specifications.
- (ii) The value of total savings is negatively correlated with the probability of being poor and constitutes an effective mitigating mechanism against poverty. The total value of remittances received has a similar association. Interestingly, however, the fact of receiving any remittances is correlated with a higher probability of being poor. This indicates that many families rely on outside help in order to stay afloat.
- (iii) Household size is consistently correlated with a higher risk of poverty. The share of dependents and, to a lesser extent, the share of people with disabilities are also important risk factors. Households with a female household head are also at much greater risk (almost twice as likely) of becoming poor.
- (iv) Environmental hazards increase the odds of being poor by 14% in the basic specification, although this effect goes down to 6% when controlling for all other factors. Access to health

insurance is another strong protector from poverty, reducing the probability of being poor by 42% to 53%.

- (v) In terms of occupation, household heads working for a wage in the agricultural sector face the highest risk of poverty. Wage workers in the non-agricultural sector come second, while farm owners and, in particular, business owners outside the agricultural sector are far less exposed. The share of household members working off-farm has a clear protective effect against poverty.

In addition, when combining the significant coefficient with the trends of the associated variable, we are able to identify what has driven change. For example, we know that education is associated with non-poverty, and that households whose head has a primary education are about 50% less likely to be poor than households with no education. From the trend of the variable, we also observe a slowdown in the reduction of households with no education in the second period (compared with the first period). This implies that there was a slowdown in educational improvement among household heads in Rwanda, which has had a negative impact on the poverty reduction rate.

Third, the analysis identifies how the different households, categorised by their trajectories, are spread across the country and it also identifies the determinants of these trajectories – that is, which factors are associated with sustained escapes versus chronic poverty and temporary escape, as well as non-improvement versus (temporary) impoverishment. We hence learn that the Southern and Eastern Provinces are home to more escapers on average, but that these escapes are more sustained in the Eastern Province. It becomes clear that the Girinka Programme is a non-negligible factor in poverty escapes, in particular in sustained poverty escapes. On the other hand, the Vision 2020 Umurenge Program (VUP) is associated with fewer poverty escapes.

Explaining poverty dynamics through qualitative analysis

A key strength of the qualitative approach, and an advantage over the quantitative approach, is that it allows us to understand a continuity of behaviours (and events) and explanations for these behaviours. It brings narratives and perceptions into the loop, which is of major importance when we are studying individuals, as their choices – together with their environment – affect their well-being.

In this section, we illustrate the findings derived exclusively from the qualitative analysis by showcasing two findings from Bird et al. (2019) in their analysis of poverty dynamics in Rwanda. The authors use a qualitative approach based on life history interviews and key informant interviews to identify and explain the factors of poverty.

Spousal harmony was identified as a key factor, across study sites and well-being groups, in enabling accumulation and poverty escapes. The importance of spousal harmony for poverty outcomes was explained in terms of harmonious couples being more able to make good decisions related to enterprise, investment and household budgeting, as they were more likely to make joint and negotiated decisions and to pool earnings in a transparent manner. It is worth noting that while some couples are harmonious by nature, others achieve harmony through active negotiation. Given the context of patriarchy, women have more agency in these negotiations at particular times, for example when they gain an asset, join a Tontine or gain support from an NGO.

Regular saving through membership of a Tontine (an informal savings and credit group) was also identified as a crucial ingredient for improved well-being in many life histories, even amongst the poorest

households. Tontines have a long history in Rwanda but have been reinvigorated thanks to support from CARE and other international NGOs, followed by enthusiastic endorsement by local government.

People from all poverty trajectories, from the chronically poor to the never poor, participate in Tontines, with the exception of only the most severely poor. While Tontines are predominantly women's groups, men's groups and mixed groups are now emerging. More affluent households participate in two or three different groups and some participants engage in complex strategies to maximise the benefits that they gain, borrowing from one Tontine to repay loans from another.

Tontines operate on a 'save to borrow' principle, and the loans are often used as a source of capital to fund house renovations, children's education, investments (in land and livestock) and health insurance as well as to deal with emergencies. The loans are relatively small and short-term, with interest rates of between 5% and 10% per month (or 60–120% per cent APR).

The institutional arrangements for Tontines are quite elaborate, as they draw on both the social capital of members (their 'respectability' or social standing),¹⁰ as well as the saving ability of the members' households.

The rules of Tontines differ, with some meeting weekly and others monthly and the amounts saved by members ranging from 200 Rwf per week to 20,000 Rwf per month, depending on the wealth of members. Generally, Tontines provide an annual lump sum payment which is proportional to the amount invested. This is bolstered by the interest charged on short-term emergency loans to members, which help with income smoothing and dealing with shocks and contingencies. Both the savings opportunities and emergency loans were strongly valued by respondents from all well-being groups, with annual lump sum payments being used to invest in non-farm enterprises or to purchase agro-inputs, pay secondary school fees and health insurance premiums and invest in home improvement.

However, some life history respondents pointed to the difficulties of participating in savings groups, such as lack of transparency and corruption. Others mentioned how accruing money to save to a timetable could be stressful.

Nevertheless, long-term membership of a Tontine was found to have been an important starting point for the pathway out of poverty for many households and the impact was particularly strong where both husband and wife saved in different groups, enabling both spouses to both save and borrow. Men tend to have more money to save, as the gendered division of responsibility provides them with more income. They tend to use their lump sum savings to make investments, while women tend to be responsible for paying health insurance premia for the family.¹¹

Deepening the understanding of poverty through Q² analysis

A key strength of using a mixed approach, combining both quantitative and qualitative methods, is that findings from one approach (or method) can orient further research from the other approach, which eventually brings a better understanding of the subject matter.

¹⁰ This may exclude some groups, including the poorest. Some Tontines accept members who can save only 200 Rwf per month, meaning that they are accessible to very poor households, though not necessarily the poorest.

¹¹ This can lead to women diverting capital from investment in productive enterprise, potentially making them more economically reliant on their male spouse, reducing their agency and negotiating power, and increasing their vulnerability should the marriage break down.

In this section, we provide an illustration of combined results from both the quantitative and qualitative analysis (Shepherd, 2019). This mixed approach uses an integrated narrative to explain the slowdown in poverty reduction in Rwanda. We focus on land scarcity and the rural nonfarm economy (more can be found in Shepherd, 2019).

We learn that land scarcity appears to have reached a tipping point in the 2010s. For a progressively increasing number of households, the land they own is not enough to provide subsistence let alone escape poverty. For most of these households, wages earned through casual labour, mostly in farming, is the unsatisfactory necessary alternative; unsatisfactory because casual wages are low and precarious, with only the VUP public works programmes setting something of a wage floor. Households with very small landholdings have not been able to take advantage of the positive enabling environment created by the government for smallholder agricultural growth.

At the same time, while agricultural growth and productivity growth have been healthy, there has been slow growth of the rural nonfarm economy, which could otherwise have compensated for land scarcity by providing other routes out of poverty. This slow growth is accounted for partly by limited demand from farm households for nonfarm goods and services, and partly by the scarcity of cash in the household economy (cash being required to pay fees and public services). Regulatory restraints may also account for a part of this slow growth.

Rural-urban migration is identified in the qualitative research as a key interrupter of poverty, with construction (for men) and restaurants and domestic work (for women) the main sources of income. This not the case in the quantitative analysis, however, raising the concern that urbanisation is not the poverty interrupter in Rwanda that it has been found to be in other countries.

Sending remittances is common especially, but not only, amongst chronically poor households. It appears to be more of a survival mechanism than a pathway out of poverty. Remittances and savings are the two sources of income which grew during period 2013/14 to 2016/17 period by comparison with the period 2010/11 to 2013/14. These have acted as a countervailing force against the trend of slowing poverty reduction; without them, the slowdown would have been worse. The later period has seen a 'take-off' in savings, which are necessary for accumulating assets but which can also be used to defray household expenses, as the examples above illustrate.

6. Conclusions

In this paper, we compare the (qualitative) life history approach and the (quantitative) panel expenditures approach to identifying poverty trajectories and their determinants. The qualitative approach provides narratives and perceptions about events in a continuous life, with specific focus on selected years, as well as explanations of behaviour or trends from the subjects themselves, or from researchers' observations. The qualitative approach can also put numbers on some aspects of the narrative created. The quantitative approach does not include explanations from the subjects, or narratives and perceptions of their behaviour. However, by providing numerical answers at repeated points in time, it can provide proxies and rough explanations for the aggregate factors of poverty in a wider population. In a nutshell, the quantitative approach identifies (some of) the factors of poverty (dynamics), while the qualitative approach explains (some of) the factors of poverty. This is why a combination of both methods in analysing poverty (dynamics) is of high value.

In this paper, we first explore the difference in categorisation using the expenditures and the life history approaches. We find that using one or other approach usually leads to the same categorisation when considering the categorisation between poor and non-poor, with a match in 47 out of 66 cases. Among the non-matching cases, the quantitative categorisation underestimated the level of poverty in comparison to the qualitative categorisation in 15 out of 19 cases, and most of the households categorised differently using the two the approaches are categorised as being just above the poverty line in the qualitative research. When we compare poverty trajectories, the matches drop to 9 out of 22 of cases. However, a systematic analysis of the differences in poverty trajectories using the life histories qualitative approach and the expenditure quantitative approach highlight five major reasons for mismatches. By analysing four categories of comparison results, that is perfect matches, long term matches, partial matches and no match, we are able to identify key sources of the differences in poverty trajectories using both approaches. First the closeness to the poverty line may results in similar assessments but different categorisation as poor or non-poor. Second, successive small changes captured by the expenditures approach may lead to different trends. Third, the identification of the exact time of change may differ in both methods leading to different transitory patterns, partly because the two approaches give weight to different indicators or variables. Fourth, there are some differences in how some events, especially investments in assets, are revealed in both methods. And fifth, some temporary changes may not be considered in the qualitative approach.

Finally, looking at correlation of well-being trends, there is a positive correlation between total expenditures growth and trends in dynamic wealth ranking which is weak over the short periods considered but stronger over a longer period of time.

The paper also illustrates the types of findings that can be generated by the quantitative approach, by the qualitative approach and by a combination of the two approaches. Using both approaches in combination and in sequence improves the understanding of poverty, and this is especially true for the analysis of poverty dynamics, where the categorisation of poverty trajectory may differ from one approach to the other. This finding mirrors previous literature on this subject. The mixed-method approach thus brings more consistency to the analysis, and should be preferred whenever possible.

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Annexes

Annex A

Table 8: Determinants of poverty status (random-effect logit)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Baseline	Policies	Health	Finance	Occupation	Amenities	All
Poverty status							
Kigali	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Southern Province	2.243***	2.208***	1.962***	1.429***	1.499***	1.701***	0.937***
	(0.0403)	(0.0395)	(0.0345)	(0.0242)	(0.0258)	(0.0308)	(0.0156)
Western Province	2.005***	1.967***	1.770***	1.210***	1.369***	1.528***	0.822***
	(0.0365)	(0.0355)	(0.0314)	(0.0208)	(0.0237)	(0.0280)	(0.0138)
Northern Province	2.018***	2.048***	1.829***	1.198***	1.395***	1.528***	0.884***
	(0.0393)	(0.0397)	(0.0348)	(0.0220)	(0.0259)	(0.0299)	(0.0158)
Eastern Province	1.150***	1.171***	1.018	0.764***	0.819***	0.899***	0.564***
	(0.0208)	(0.0212)	(0.0180)	(0.0131)	(0.0143)	(0.0164)	(0.00961)
Age of hh head	1.047***	1.051***	1.094***	1.039***	1.036***	1.041***	1.070***
	(0.00197)	(0.00197)	(0.00210)	(0.00184)	(0.00185)	(0.00195)	(0.00189)
Sq age of hh head	0.999***	0.999***	0.999***	1.000***	1.000***	0.999***	0.999***
	(0.0000178)	(0.0000177)	(0.0000183)	(0.0000167)	(0.0000169)	(0.0000177)	(0.0000169)
No educ	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Primary	0.378***	0.381***	0.378***	0.477***	0.449***	0.409***	0.567***
	(0.00386)	(0.00386)	(0.00380)	(0.00467)	(0.00439)	(0.00417)	(0.00539)
Secondary	0.0140***	0.0143***	0.0194***	0.0355***	0.0216***	0.0252***	0.0868***
	(0.000658)	(0.000675)	(0.000889)	(0.00161)	(0.000985)	(0.00122)	(0.00396)
Urban status	0.395***	0.399***	0.410***	0.419***	0.433***	0.494***	0.537***

	(0.00492)	(0.00495)	(0.00506)	(0.00516)	(0.00536)	(0.00621)	(0.00667)
Female hh head	1.874***	1.860***	1.687***	1.895***	1.484***	1.923***	1.492***
	(0.0214)	(0.0211)	(0.0189)	(0.0204)	(0.0163)	(0.0219)	(0.0158)
2011	ref.	ref.	ref.	ref.	ref.	ref.	ref.
2014	0.924***	0.875***	0.956***	1.095***	0.999	0.945***	1.078***
	(0.00713)	(0.00688)	(0.00749)	(0.00855)	(0.00774)	(0.00740)	(0.00880)
2017	1.131***	1.055***	1.256***	1.391***	1.189***	1.168***	1.364***
	(0.00947)	(0.00911)	(0.0107)	(0.0116)	(0.00993)	(0.00994)	(0.0121)
Hh size	1.421***	1.419***	1.300***	1.513***	1.404***	1.453***	1.433***
	(0.00368)	(0.00365)	(0.00344)	(0.00383)	(0.00353)	(0.00382)	(0.00371)
Received a cow from gov.		0.975					1.065***
		(0.0148)					(0.0152)
Received gov. support		1.576***					2.042***
		(0.0192)					(0.0246)
Share of dependents			7.786***				4.556***
			(0.143)				(0.0839)
Share of persons with disability			1.218***				1.129***
			(0.0125)				(0.0112)
Has health insurance			0.470***				0.580***
			(0.00393)				(0.00477)
Environmental risk			1.145***				1.062***
			(0.00924)				(0.00847)
Log total hh savings				0.879***			0.899***

				(0.000747)			(0.000784)
Any remittances				31.80 ^{***}			19.83 ^{***}
				(0.929)			(0.581)
Log total value of remittances				0.654 ^{***}			0.690 ^{***}
				(0.00218)			(0.00231)
Wages from agr. sector					3.892 ^{***}		3.070 ^{***}
					(0.0338)		(0.0260)
Wages from non-agr. sector					1.205 ^{***}		1.016
					(0.0118)		(0.0101)
Business in non-agr. sector					0.640 ^{***}		0.565 ^{***}
					(0.00655)		(0.00582)
Owns a farm					0.833 ^{***}		0.679 ^{***}
					(0.00940)		(0.00769)
Share working off farm					0.308 ^{***}		0.651 ^{***}
					(0.00568)		(0.0127)
Dist. to drinking water						1.000 ^{***}	1.000
						(0.00000378)	(0.00000369)
Access to piped water						0.0415 ^{***}	0.106 ^{***}
						(0.00135)	(0.00315)
Obs.	5389	5389	5389	5389	5389	5389	5389

Households	1797	1797	1797	1797	1797	1797	1797
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Note: Exponentiated coefficients; standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$