Setting Poverty Lines for Consumption-Based Welfare Measures

A Research Agenda

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Abstract

This paper presents a unified analytical framework to organize and review the literature on consumption-based poverty measurement, with a focus on establishing absolute poverty lines. Based on this framework, the paper identifies several gaps in the existing literature and areas where applied poverty analysts would benefit from sharper recommendations. Based on these considerations, the paper proposes some critical topics for further research.

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Setting Poverty Lines for Consumption-Based Welfare Measures: A Research Agenda

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1 Introduction

This paper provides a review of the literature on consumption-based poverty measurement, with an emphasis on setting absolute poverty lines. Its objective is to identify gaps in the literature, and propose a research agenda that can help improve the work of analysts in the field of poverty measurement. The paper does not discuss income-based approaches, it does not delve into poverty dynamics, nor does it discuss strategies for updating poverty lines. It does not address multidimensional poverty, either. International poverty lines, as well as relative, hybrid, or subjective lines, are also left out. Even though these boundaries narrow the scope of the review quite a bit, they still leave ample room to identify questions that do not yet have a definitive answer, but need to be addressed in order to support practitioners in their consumption-based analysis of poverty and inequality.

A first set of questions (“level 1” questions) concerns a few high-level dilemmas that are regularly faced by poverty analysts. When a new survey is completed and fresh data become available, an important choice is whether to estimate a new poverty line or update the existing one; if the former strategy is preferred, the next choice is whether to opt for a single poverty line or for multiple poverty lines (one for each area of the country, and/or type of household). The overall strategy to be adopted when constructing a food poverty line and including a non-food allowance are also often sources of doubt, as several approaches are available. These questions, along with many others, are asked recurrently by practitioners, and the general recommendations offered by the literature often fail to resolve them.

A second set of questions (“level 2” questions) focuses on more specific details, such as “How to identify a reference food bundle to estimate a food poverty line?”, or “How to select the reference group for the calculation of the calorie unit cost needed to estimate the food poverty line?” There is also the question of whether to add the non-food allowance to the food poverty line or, following the Orshansky (1963, 1965) approach, rescale the latter. These issues become even more intricate when considering adjustments for prices, household size and composition.

There is even a third set of questions (“level 3” questions) that concerns many seemingly minor computational details. Prais (1959) offers an example of interest to poverty analysts, when he introduces the distinction between the plutocratic and democratic formulas to compute the average budget shares or the average cost of one calorie. Other times analysts must decide whether to use the mean or the median, or whether to use expansion factors at the household-
or the individual-level (or not use the weights at all). More examples could be easily added, as they come up at every step of the analysis.

Some of these questions have not yet garnered enough attention in the literature; others have been thoroughly explored, but there is no clear ranking of the different solutions available; more in general, it is not always easy to see the “big picture” of how the questions outlined above – and their answers – relate to each other. We believe this is due in part to the lack of a unified analytical framework for poverty measurement. The word “unified” is key here: the literature on the theoretical foundations of poverty measurement is long-standing – yet, we argue, disjointed, and ultimately of limited help in practical settings.

In fact, the current status of the “economics of poverty” can be summarized as follows. Deaton and Zaidi (2002), building on Deaton and Muellbauer (1980), set up a theoretical framework that leads to the choice of consumption expenditure as a welfare indicator. Mancini and Vecchi (2022) review and reiterate DZ’s analytical framework: notably, the task of setting poverty lines was explicitly put outside the boundaries of DZ’s review and update. On the other hand, Ravallion (1994, 1998) lays out the theoretical foundations of poverty line setting, but he does not devote much space to the consumption aggregate. However, viewing the process of poverty measurement as comprising two distinct and autonomous steps — first constructing the welfare indicator, and then setting the poverty line — is misguided. Ravallion (2016) is a magnum opus that encompasses the main building blocks of poverty measurement, but it is not targeted at practitioners.

In sum, we see a sort of coordination failure, on the theoretical side, between two pillars of the “economics of poverty”: a synthesis of these perspectives, one that explicitly targets the questions that arise recurrently in applied poverty work, has not yet been pursued.

The rest of this paper is organized as follows. In section 2, we sketch a (simplified) unified analytical framework and argue that it should be the first priority in the research agenda. In section 3, we review the literature in the light of the theoretical framework. In section 4, we offer a summary of the research agenda that emerges from the literature review.
2 A unified analytical framework

There are many reasons for advocating for a unified theoretical framework of poverty measurement. First, and paradoxically, there are practical reasons; work in the field will always raise questions that are context-specific, for which there are no ready-made answers. Absent theory, answers come from the past (path dependence), from intuition, or from authority. Theory, conversely, offers a more robust and justifiable avenue that can provide a benchmark against which potential solutions can be evaluated. Even if some discretion is likely to play a role in the final choice, theory clarifies how far the compromise falls from a given “first best” (Decerf, 2023). Additionally, theory aids in structuring and comprehending a literature marked by semantic disorder and fragmentation: different "traditions" and seminal works tend to use different terminology and notation, and the discussion would benefit from some standardization. Furthermore, it can be challenging at times to ascertain the consistency of solutions proposed by different papers addressing similar issues. The absence of a common framework inhibits analysts from comparing alternative strategies and from coming up with an ordering. In the rest of this section, we sketch a preliminary outline of such a framework, in order to support our review of the literature; further development of the framework is, in our view, a priority for future research efforts (see section 4.1).

Let us start with standard consumer theory. Consumption of goods determines welfare, and, under regular restrictions on preferences, the utility function represents households’ preferences over bundles. Figure 1 shows a graphic representation of individual preferences by means of a set of indifference curves defined on consumption bundles associated to different utility levels $u$. 
Figure 1: poverty and utility

Note: $u_1$, $u^*$ and $u_2$ are different levels of utility, in increasing order.

Then, the utility level $u^*$ is a natural candidate for setting the poverty line: household $h$ is poor if and only if $u_h < u^*$ ($u_h$ is the level of utility achieved by household $h$). The problem is that we cannot observe $u$, and consumption bundles are an awkward metric ($\mathbb{R}^N$). One solution is expressing utility in monetary terms. This is where the expenditure function comes into play. The expenditure function $e(p_h, u)$ is the solution of the “dual problem” of the consumer. More specifically, it is the minimum expenditure for the household $h$ to achieve a utility level $u$ given a market price vector $p_h$ and the household’s preferences. Standard consumer theory proves that:

$$u_h < u^* \iff e(p_h, u) < e(p_h, u^*)$$

Equation (1) implies that for any given price vector $p_h$, the expenditure function is a utility function, namely a money metric utility function (MMU). Notation can be simplified by saying that a household $h$ is deemed to be poor if and only if:

$$u_h < u^* \iff x_h < z_h$$

where $x_h$ is the household’s consumption expenditure and $z_h$ is a poverty line. Note that in equation (2), $z_h = e(p_h, u^*)$ is specific to each household ($h = 1, \ldots, H$). In other words, $z_h$
indicates $h$ different poverty lines. This is because the reference standard of living $z_h$ cannot be defined independently of a price vector. The problem here is that when households face different prices, it may be that two households are equally well off (i.e. they achieve the same level of utility), but their expenditures may differ:

$$e(p_h, u^*) \neq e(p_j, u^*)$$

This clearly prevents analysts from comparing households’ expenditures directly, even when assuming homogeneous preferences.

There is, however, an equivalent way to solve the dual problem and define a single poverty line. The solution to the “dual problem” can be expressed with reference to a unique price vector $p_0$ instead of $p_h$, yielding an entirely equivalent statement:

$$u_h < u^* \iff e(p_0, u) < e(p_0, u^*)$$  \hspace{1cm} (3)

The expenditure function $e(\cdot)$ remains a money-metric utility (MMU) function, but now, the poverty line is uniquely defined: $z = e(p_0, u^*)$. This procedure raises another issue: while $e(p_h, u)$ is the household’s actual expenditure, $e(p_0, u)$ is the outcome of a mental experiment, and it is not observable. The solution is found by introducing a true-cost-of-living index (TCLI).

A $TCLI_h(u)$ for household $h$ is defined as:

$$TCLI_h(u) = \frac{e(p_h, u)}{e(p_0, u)}$$  \hspace{1cm} (4)

The true cost of living index in equation (4) tells us how expensive is for household $h$ to achieve utility $u$ when facing prices $p_h$ compared to a situation where prices are $p_0$. The index $TCLI_h(u)$ can be used to adjust the purchasing power of households living in different price environments and compare their living standards.

There are at least two different ways of performing this kind of adjustment. The first one has been suggested by Blackorby and Donaldson (1987, 1988) and consist in adjusting household $h$’s expenditure $x_h$ by using $TCLI_h(u^*)$, i.e. the true cost of living calculated at the utility level $u^*$. This leads to the so-called welfare ratio:
\[ WR_h = \frac{x_h}{TCLI_h(u^*)} \]  \hspace{1cm} (5)

It is a simple matter of algebra, by using equation (3), to show that, according to the definition of the welfare ratio in eq. (5), household \( h \) is poor if and only if:

\[ WR_h < z \]  \hspace{1cm} (6)

where \( z = e(p_0, u^*) \). A second option is to adjust the household expenditure by using \( TCLI_h(u) \), i.e. the true cost of living calculated at the utility level \( u \) of household \( h \). This is the so-called equivalent expenditure (Ravallion 2016):

\[ EE_h = \frac{x_h}{TCLI(u)} \]  \hspace{1cm} (7)

It is, again, immediate to verify that, according to equation (7) household \( h \) is poor if and only if:

\[ EE_h < z \]  \hspace{1cm} (8)

Both the adjustment procedures defined in (5) and (7) imply an identification criterion for poverty status based on a single, national level poverty line. In general, \( WR_h \neq EE_h \), unless households’ preferences are homothetic, and, as shown by Deaton and Zaidi (2002) only the equivalent expenditure \( EE_h \) is a proper money metric utility function. However, \( WR_h(u^*) = EE_h(u^*) \), which means that even if the two welfare indicators are different, they lead to the same identification criterion for poverty status.

In conclusion, we have identified three possible ways to set a poverty line. Each of these approaches are rooted in the expenditure function and, from a theoretical speaking, are equivalent:

1. \( u_h < u^* \iff x_h < z_h \) 

(multiple lines)
Conditions 1-3 are all expressed in term of nominal expenditures, and they help clarify that there is a link between the multiplicity of the poverty lines (defined at the household level) and the price adjustment of household expenditure by means of a true cost of living index. The national level unique poverty line $z$ can be converted in a household specific poverty line $z_h$ by multiplying $z$ by the true cost of living index used to adjust/convert nominal expenditure into real expenditure.

This brief analytical overview enables us to reach a few conclusions and recommendations. Firstly, it would be highly beneficial to further explore the relationship between multiple poverty lines and the price adjustment mechanism. In this regard, the development of a unified theoretical framework is crucial and highly recommended. Secondly, multiple poverty lines implicitly define a set of price deflators given by the ratios $z_h/E(z_h)$ which can be compared with directly estimated spatial deflators used to convert nominal expenditure into real expenditure. A further recommendation is therefore to invest in understanding the theory and practice of comparing single and multiple poverty lines and implicit and explicit deflators (see section 4.2).

3 Review of the literature

There are few attempts to take stock of the literature on poverty lines (see, among others, Bidani et al. 2001, Kakwani 2003, and Haughton and Khandker 2009). Ravallion (2016) is perhaps the most updated reference available, and arguably the most comprehensive (nearly 150 pages dedicated to poverty lines). Our strategy here is to narrow the scope of the review with the help of the framework developed in section 2, and following Ravallion’s organization of the topic. The framework can be summarized by the following equation:

$$u_h < u^* \iff \frac{e(p_h, u)}{x_h} < \frac{e(p_0, u^*) \times TCLI_h(u)}{z_h} \quad (9)$$

Equation (9) summarizes the issues raised by the task of setting the poverty line(s):
1. How to construct the nominal consumption aggregate $x_h$? This is where all the challenges related to measuring consumption expenditure need to be addressed.

2. How to nail down $u^*$? According to Ravallion’s terminology, this is the issue of referencing.

3. How to monetize $u^*$ and transform it into an expenditure function $e(.)$? This is the identification problem.

4. How to compare households who face different prices? How to deal with $TCLI_h(u)$? This is the analytical step that involves price adjustments.

5. Do we estimate a single national level poverty line $z$, or multiple poverty lines $z_h = e(p_h, u^*)$? If one opts for this second empirical strategy there is an advantage in terms of specificity, but a risk of inconsistency of poverty comparisons. The opposite holds true when poverty estimates are based on a single national level poverty line.

Each of the steps from 1) to 5) is discussed in the rest of this section.

One further element, omitted from the framework sketched in this section, refers to the adjustment for differences in household size and composition. We will return to this in the final section (see section 4.8).

### 3.1 Measuring consumption expenditure

The main issues in constructing the consumption aggregate involve estimating food consumption, identifying non-food expenditures that are relevant for measuring well-being, imputing housing expenses, and estimating the consumption flow from durable goods. Deaton and Zaidi (2002), provides the most comprehensive review of the issue of constructing the consumption aggregate. Mancini and Vecchi (2022) updated the guidelines of Deaton and Zaidi, incorporating the most recent developments in the literature. For this reason, there is no need to delve deeper into these issues here, directing readers to previous literature references for further details.

It is important, however, to point out that, as implicitly highlighted by Lanjouw and Lanjouw (2001), the coverage of the consumption aggregate is linked to the coverage of both the poverty line and the price deflator. In other words, there must be consistency between the poverty line and the household level welfare indicator, so it is not appropriate to address the issues of
constructing the consumption aggregate, identifying the poverty line, and estimating the spatial
deflators separately (see section 4.3).

3.2 Referencing

The referencing problem concerns how to set $u^*$, that is, the minimum level of utility that must
be reached if a household is to be considered non-poor. This threshold, defined in the utility
space, sets poor households apart from non-poor ones. Most solutions for the referencing issue
look for some sort of objective anchor for what constitutes “the minimum”. For the food
component of the standard of living, this is usually achieved by bringing in nutritional
requirements. A nutritional requirement can be defined on a normative basis, or estimated
starting from the characteristics of the population considered. As for the non-food component,
the issue is more difficult, and the literature offers different solutions. In
any case, the identification of $u^*$ represents a crucial step that distinguishes the “economics of
poverty” from standard microeconomics. It is important to emphasize that referencing requires
incorporating ethical judgments and external information into the analytical framework. In this
regard, referencing is what qualifies setting a poverty line as a political decision (Deaton 1997:
144; Decerf 2023b: 3).

3.3 Identification

The identification problem has to do with mapping the utility level $u^*$ into the expenditure space
(see for instance equation 9). In other words, it is the answer to the question: how much does
$u^*$ cost? If we knew the shape of the household’s utility function $u(\cdot)$, and relative market
prices, standard microeconomics would provide the answer. Figure 2 illustrates the graphical
solution to the expenditure minimization problem.
In theory, an ad-hoc specification of the utility function can be attempted, but in practice identifying the shape of $u$ is just not a viable solution. Practitioners need a workaround. In the literature, the problems of referencing (how to set $u^*$?) and identification (how much does $u^*$ cost?) are often solved simultaneously, so that the answers to each question remain implicit and are hard to disentangle. In practice, the solution to referencing and identification has taken the form of choosing among three main approaches for calculating a poverty line:

- “Paternalistic” poverty bundle approaches
- Food energy intake (FEI) method
- Engel curve-based methods

The “paternalistic” poverty bundle approaches have been introduced, among others, by Booth (1880s), Rowntree (1904), Hunter (1904), and Bowley (1915). These approaches define an explicit bundle $q^*$ that fulfils “basic needs”, based on normative levels of adequate nourishment, clothing, housing, etc. Then, the poverty line is obtained directly by calculating the cost of $q^*$. Recent examples of the application of the “paternalistic poverty bundle method” include India (Rangajaran et al. 2014; Dimri and Maniquet 2023), but also countries like Italy, the Russian Federation, and Botswana. Recently, there has been a “revival” of linear programming as a tool to pin down $q^*$ in the field of economic history (Allen 2017). The critical aspect in this method is that nutritional requirements often play a crucial role.
role in the definition of the food component of \( q^* \) and there is no guarantee that a normative basket will be consistent with actual behavior and preferences. This is the reason why Ravallion (2016) talks about “paternalistic lines” (p. 193).

The food energy intake (FEI) method is due to Greer and Thorbecke (1986) and is based on the relationship between caloric intake and total expenditure. The idea is to estimate the total consumption expenditure at which food energy intake is just sufficient to meet and exogenously given the food energy requirement (ER). Figure 3 illustrates.

**Figure 3: the FEI method**

In the FEI approach, the referencing and identification problems are solved in a single step, without even needing to go through an explicit bundle \( q^* \). The approach has been criticized by Ravallion (1994, 1998), Ravallion and Bidani (1994), who argue that the relationship between caloric intake and total expenditure is not sufficiently stable to be used as a criterion for identifying the poverty line.

The Engel curve-based methods are perhaps the most popular methods among practitioners currently. The simplest version of the Engel curve-based methods is Orshansky’s method (Orshansky,1960s; Citro and Michael 1995; Fisher 1992, 2008; Deaton, 2023). The starting point is of the approach is a food poverty line \( z_F \), estimated as the cost of a “basic needs” food bundle. The Orshansky total poverty line is then obtained as:
\[ z_{ORS} = \frac{z_F}{w_F} \]

where \( w_F \) is some reference food budget share. The real problem then becomes that of identifying an appropriate food budget share. Ravallion (1994), and Ravallion and Chen (1996) proposed a refinement of the Orshansky’s method along these lines. The non-food component of the poverty line is identified as upper-bound \( \left[ z^{U}_{RAV} \right] \) and lower bound \( \left[ z^{L}_{RAV} \right] \) non-food allowances, and the poverty line is obtained additively:

\[
\begin{align*}
    z^{U}_{RAV} &= z_F + E(x_{NF}|x \approx z_F) \\
    z^{L}_{RAV} &= z_F + E(x_{NF}|x \approx z_F)
\end{align*}
\]

In practice, the food budget share used to estimate the total poverty line is based on the consumption pattern of the poor or of the extremely poor households.

While most steps described in this section are well known to poverty analysts, there are many empirical issues on which there are no clear guidelines. Consider, as an example, the following issues:

- How to estimate \( z_F \). Should one use an explicit basic food bundle, anchored to some nutritional requirement, or would it be better to estimate the minimum cost of one calorie? How to choose the reference group for the estimation of \( z_F \)?
- The Engel curve-based methods provide a shortcoming for identifying non-food allowances. Should the focus be primarily on the lower or upper-bound non-food allowances?
- The Orshansky and Ravallion methods are both Engel curve-based methods so that it should be \( z_{ORS} \approx z^{U}_{RAV} \), though the link between the two is not crystal-clear.

In short, there is a lack of detailed, comprehensive guidelines to implement Engel curve-based methods for identifying the total poverty line (see section 4.4).

### 3.4 Price adjustments

To make households’ expenses comparable and consistent with a single poverty line, a TCLI is needed. However, \( TCLI_h(u) \) depends on the utility level \( u \). Hence, the estimation of a true cost of living index requires knowledge of the household’s utility function. In practice, \( TCLI_h(u) \)
can be approximated by a price index. Deaton and Zaidi (2002) suggest approximating $TCLI_h(u)$ with a household-level Paasche price index, while Blackorby and Donaldson (1987, 1988) advocate for the use of a household-level Laspeyres price index focused on the consumption pattern of poor households. On this matter, the unified analytical framework helps to clarify the consequences regarding the choice of a Paasche price index vs. a Laspeyres price index: generally, such a choice is not neutral. There is a vast literature that discusses details of the estimation of spatial price indices for poverty measurement, but there are many open questions still. A selection of topics mostly discussed in the literature includes:

- Properties of index number formulas, namely which index provides the best approximation of $TCLI_h(u)$. The issue of “substitution bias” is at the forefront. E.g. Diewert (2001, 2009), Gaddis (2016), Ray (2018)

- Consequences of price data limitations, particularly limits of unit values and lack of reliable non-food price data. E.g. Deaton (1988), Deaton and Dupriez (2011), Gibson and Rozelle (2005), Gibson and Kim (2019), Amendola, Mancini, Redaelli and Vecchi (2024)


However, the unified analytical framework, and in particular the relationship between the single poverty line and the multiple poverty lines setting suggest that one of the main issues is to understand what would be needed to address the shortcomings of price indices used in the computation of real (spatially adjusted) welfare indicators, namely the limited coverage of spatial price indices used to adjust nominal expenditures. “A food Paasche index” does not seem to be a reliable solution (see section 4.5).

### 3.5 Multiple poverty lines

Theory led us to conclude that the poverty line always incorporates the heterogeneity of households, even if implicitly. There are, basically, two empirical strategies to identify and measure poverty:
• Strategy 1: a household is poor iff $x_h < z_h$. In this case the analyst estimates multiple poverty lines using nominal expenditure $x_h$ as a welfare indicator.

• Strategy 2: a household is poor iff $x_h < z \cdot TCLI_h(u)$. In this case the analyst estimates a national poverty line, using real expenditure $x_h/TCLI_h(u) < z$ as a welfare indicator.

The choice between strategy 1 and strategy 2 involves an important trade-off: consistency vs. specificity. Consistency means that the utility level $u^*$ should not change across households, i.e. the poverty line(s) should measure a fixed level of welfare. Specificity implies that the poverty line should be specific to the context, i.e. it should measure the cost of $u^*$ under the specific conditions a household faces. In general, strategy 1 puts consistency at risk, while strategy 2 is at odds with specificity. Most approaches to setting poverty lines strive to find a balance between these two requirements (Arndt and Simler 2007, 2010; Mahrt, Herforth, Robinson, Arndt and Headey, 2022). The question is if there is an empirical ordering of the strategies available to tackle this trade-off (see section 4.6).

4 Research agenda

The discussion outlined so far has identified several areas where further research is needed. This section provides a concise summary of these research areas, plus a few additional ideas, in the form of short synopses of potential research projects.

4.1 Economic foundations of poverty measurement: A unified framework

Poverty analysts must contend with a plethora of questions on how to best carry out each step of a complex process, which includes measuring household welfare, adjusting for differences in prices faced by individual households, and setting a poverty line. Most of these questions are highly idiosyncratic: they arise from data limitations and peculiarities of the local context. A strong grasp of the economic foundations of poverty measurement is essential for coming up with answers: theory defines the parameters analysts are aiming to estimate, and provides a benchmark against which competing solutions and inevitable compromises can be evaluated and ranked. However, many obstacles can disrupt the vital link between theory and practice: one of the difficulties is the fact that the literature on the theoretical underpinnings of poverty measurement is essentially disjointed and fragmentary. This is exemplified by two “pillars” of the field: the theory underlying the construction of a (real) welfare indicator, laid out in Deaton
and Muellbauer (1980) and Deaton and Zaidi (2002), and the theory of poverty line setting, laid out in Ravallion (1994, 1998, 2016), which are linked but not explicitly integrated. The proposed paper should provide a unified view of the theory of poverty measurement. Its contributions include the availability of a comprehensive, accessible reference on the topic, and the consolidation of disorganized, sometimes conflicting notation and terminology; this in turn would encourage practitioners to engage more frequently and explicitly with the theoretical foundations of their analytical choices, would clarify the links between different “building blocks” of poverty measurement, and would allow for more productive discussions of the benefits and shortcomings of alternative methods proposed in the literature.

4.2 Comparing single and multiple poverty lines: Theory and practice

Among the most fundamental dilemmas faced by poverty analysts is the choice between two alternatives: using a single poverty line, or multiple poverty lines. In the first case, the expenditures of any given household are set against a common benchmark: this requires adjusting each household’s welfare aggregate to compensate for differences in prices, household composition, and other characteristics that may affect their ability to reach a given level of utility. In the second case, it is the poverty lines themselves that change, adapting to households’ individual conditions. In theory, these two approaches yield the same results; in practice, that is not the case, due to the different adjustments for household heterogeneity that are explicitly or implicitly performed by each approach. Some of the trade-offs between single and multiple poverty lines have been investigated (Ravallion and Bidani 1994), but the picture of the differences between the two methods is not yet complete. The proposed paper should investigate the conditions under which the two approaches give different results, and assess their pros and cons in different contexts, with the aim of advising applied poverty analysts on best strategies to be followed when estimating poverty lines.

4.3 The consequences of imperfect and inconsistent coverage of consumption expenditures, price deflators and poverty lines

The issue of “goods coverage” (Ravallion 2001) is usually raised in relation to the consumption aggregate, to indicate its ability to capture all components of household expenditure. In their investigation of the comparability between differently defined welfare aggregates, Lanjouw and Lanjouw (2001) highlight that in fact, the coverage of the consumption measure itself cannot
be examined separately from the coverage of the poverty line (and in fact, at least some poverty measures are robust to changes in coverage, as long as they affect both the aggregate and the line equally). In fact, the coverage of the price deflator used to adjust nominal household expenditures is also often an issue: most times, it is severely limited by data constraints. The proposed paper should look into expanding Lanjouw and Lanjouw’s (2001) framework, adding price indices to the picture.

4.4 Engel curve-based poverty lines: Theory and practice

The cost-of-basic-needs (CBN) method for setting poverty lines, spearheaded by Ravallion (1994) is among the most popular in contexts where the goal is to measure absolute poverty on the basis of household consumption. While the method is well established, some ambiguity still lingers on not-so-small details of its implementation. The main pillar of this approach, the food poverty line, can be estimated in different ways, namely by pinning down a food bundle that matches certain criteria, or by simply “pricing” a caloric requirement; should one way be preferred to the other? How should one choose the reference group for implementing either strategy? Some grey areas remain where the non-food component of the poverty line is concerned, too. For instance, the CBN method is a close relative to the Orshansky method (Orshansky, 1960s; Citro and Michael 1995; Fisher 1997, 2008; Deaton, 2023), but the former accounts for non-food additively, while the latter uses a multiplicative approach; again, should one strategy be preferred? More in general, both the CBN and Orshansky methods hinge on the empirical relationship between food expenditure and total expenditure – the Engel curve – in order to pin down the non-food component of the poverty line. When this relationship breaks down or is noisy (due for instance to flaws of the data), the consequences on estimated poverty lines are likely to be serious, and the differences between alternatives for which we have no a-priori ordering (Orshansky, CBN lower and upper bound lines) can be extremely large. The proposed paper should provide detailed, comprehensive guidelines to implement Engel curve-based methods for identifying the total poverty line; it should clarify the differences and similarities between these strategies; and it should bring to light some empirical problems that are regularly encountered in practice, offering up some solutions.
4.5 Price adjustments for poverty measurement

The shortcomings of price indices used in the computation of real (spatially adjusted) welfare indicators are well known; the most serious and frequently discussed issues have to do with limitations of price data, namely the lack of reliable information on non-food prices, and the flaws of unit values as a proxy for market prices (Deaton 1988, Deaton and Dupriez 2011, Gibson and Rozelle 2005, Gibson and Kim 2019, Amendola, Mancini, Redaelli and Vecchi 2024). The result is that price indices used in poverty measurement typically have limited coverage (they are food price indices) and their reliability is often called into question. As serious as this problem is, viable solutions are few and far between. The proposed paper should assess strategies to overcome the problems raised by limited-coverage price indices in poverty measurement, including, potentially, the calculation of more comprehensive Paasche indices (incorporating for example rent prices), the use of alternative methods (such as the CPD method, as seen in Chen et al. 2020), and even the switch to an implicit approach based on multiple poverty lines (see WP 3).

4.6 Consistency and specificity in poverty measurement

The idea of a trade-off between the consistency and specificity of poverty lines was popularized by Bidani and Ravallion (1994). A strand of literature that includes some recent contributions (Ravallion and Lokshin 2006; Arndt and Simler 2007, 2010; Mahrt, Herforth, Robinson, Arndt and Headey 2022) has investigated possible solutions, related to the imposition of revealed preference conditions to construct utility-consistent poverty lines that vary across households. However, these extensions are not yet widely popular in applied work. The proposed paper should take stock of this literature, assessing the different strategies available and working towards the establishment of a “best practice”.

4.7 How sensitive are poverty estimates to poverty measurement methods?

The results of a poverty assessment are sensitive to seemingly minor choices made along the process that leads from data collection to final estimates. This is particularly concerning when such choices are controversial. The problem is hardly new: analysts are aware of the arbitrariness baked into some of the decisions involved in setting a poverty line, and some solutions have been investigated (ex. Pradhan et al. 2000); many poverty assessment reports
include sensitivity exercises (Mancini and Vecchi 2022). However, a systematic assessment of the sensitivity of poverty estimates to the key, recurring choices analysts are called to make (e.g. the sequence of temporal and spatial deflation, level of aggregation of price indices, identification of the reference group for obtaining a poverty line…) is not yet available. Such an assessment should span an array of different countries, and inform practitioners on which, among the many decisions they must make, are likely to be most impactful on final results.

4.8 Equivalence scales and poverty measurement

The unified analytical framework described in section 4.1 relies on the simplifying assumption that, save for the different prices they may face, households do not differ in terms of their ability to convert goods into utility. In fact, individual household characteristics typically do matter in this respect, i.e. they generate differences in well-being between households displaying the same level of expenditure (Ravallion 2016). Adjusting for such differences is essential for the accuracy of interpersonal welfare comparisons: the literature on equivalence scales is vast, heterogeneous, and difficult to navigate for most practitioners. The proposed paper should expand the analytical framework of welfare measurement to include adjustments for household heterogeneity, allowing for an assessment of the literature on equivalence scales. In the rest of this section we sketch a possible way forward.

Consider equation (1). The condition that identifies the poverty status with homogeneous preferences is: \( e(p_h, u) \leq e(p_h, u^*) \). If preferences are heterogeneous, equation (1) should be rewritten as \( e_h(p_h, u) \leq e_h(p_h, u^*) \). We can also express this with the following notation:

\[
I(\vartheta_h, p_h, u)e(p_h, u) \leq I(\vartheta_h, p_h, u^*)e(p_h, u^*)
\]

where \( I(\vartheta_h, p_h, u) \in \mathbb{R}^+ \) captures household heterogeneity, and \( \vartheta_h \) is a vector of household characteristics that identifies household needs (e.g. household size, demographic composition, the physical activity level of members, and so forth). In what follows we assume that \( I(\vartheta_h, p_h, u) \) does not depend on the utility level \( u \) and on the price vector \( p_h \), i.e. \( I(\vartheta_h, p_h, u) = I(\vartheta_h) \). Let \( \vartheta_0 \) be a reference vector of household characteristics, and \( p_0 \) a reference price vector. We normalize \( I_0(\vartheta_0) \) as follows:

\[
I(\vartheta_0) = 1
\]

In other words, \( e(p_h, u) = I(\vartheta_0) \cdot e(p_0, u) \) is the expenditure function of the reference household \( h = 0 \). The function \( I(\vartheta_h)e(p_0, u) \) is an alternative way to write the conditional
expenditure function $e_h(p_h, \vartheta_h, u)$ – see Pollak and Wales (1979) and Lewbel and Pendakur (2008). The advantage of this notation is that it helps to disentangle the welfare adjustment for differences in relative prices from the adjustment for differences in needs.

Household $h$ is deemed to be poor if and only if

$$I(\vartheta_h)e(p_0, u) \leq e(p_0, u^*)$$

Let us define now an adjusted TCLI as follows:

$$TCCLI_h(u) = \frac{I(\vartheta_h)e(p_h, u)}{I(\vartheta_0)e(p_0, u)} = \frac{e(p_h, u)}{e(p_0, u)} \times I(\vartheta_h) = TCLI_h(u) \times I(\vartheta_h)$$

where $I_h(\vartheta_h)$ acts as a coefficient that rescale the standard TCLI to adjust for differences in preferences and needs. Substituting on the household $h$ is poor if and only if:

$$\frac{e_h(p_h, u)}{TCCLI_h(u) \times I(\vartheta_h)} \leq e(p_0, u^*) = z$$

Hence, under the simplifying assumption that $I(\vartheta_h)$ does not depend on the shape of the utility function of household $h$ or on $p_h$, but only on the household’s characteristics (i.e. it depends only on needs and not on tastes), the adjustment factor $I(\vartheta_h)$ can be interpreted as an equivalence scale. To make this point even clearer, we can change the notation to $I(\vartheta_h) = ES(\vartheta_h)$. The equivalence scale “… just as a price index is used in order to make comparable consumption levels of households with different cost-of-living, equivalence scales are a way to make comparable consumption aggregates of households with different demographic composition” (Deaton and Zaidi 2002: 48).

Let $x_h$ be the total nominal expenditure of household $h$. A household $h$ is deemed to be poor if and only if:

$$\frac{x_h}{TCCLI_h(u) \times ES(\vartheta_h)} \leq z \iff x_h \leq [TCLI_h(u) \times ES(\vartheta_h)] \times z = z_h$$

Equation (11) is the equivalent of equation (9) in a framework that accounts for household heterogeneity. The main difference with respect to equation (9) is the presence of an additional “deflator”, $ES(\vartheta_h)$, to account for differences in needs and to make the welfare indicator comparable across households.
References


Bowley (1915) Livelihood and Poverty: A study in the economic conditions of working class households in Northampton, Warrington, Stanley and Reading.


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