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Defining and Measuring (Extreme) Poverty

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Abstract

An axiomatic approach is used to propose a measure of extreme poverty which is not only multidimensional in nature, but also recognizes the fact that there are interaction effects between different deprivations, and that the length of time during which deprivations are felt may also have a negative impact on household well-being. The proposed definition of extreme poverty formalizes an approach developed by Joseph Wresinski, the founder of the International Movement ATD Fourth World.

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1 Introduction

This paper uses an axiomatic approach to propose a definition of extreme poverty inspired by the life of the very poor, and more precisely by the writings on extreme poverty of the International Movement ATD Fourth World (hereafter ATD), and its founder Joseph Wresinski[1]. Born poor, Wresinski developed a line of thought – based in part on his own personal experience of what it meant for him to be poor, in which extreme poverty is conceived as a multidimensional phenomenon which can lead to violations of human rights in their indivisibility. In a detailed report prepared for the French Economic and Social Council, Wresinski (1987; see also De Gaulle-Anthonioz, 1995) defined extreme poverty as follows:

"A lack of basic security is the absence of one or more factors that enable individuals and families to assume basic responsibilities and to enjoy fundamental rights. Such a situation may become more extended and lead to more serious and permanent consequences. Extreme poverty results when the lack of basic security simultaneously affects several aspects of people's lives, when it is prolonged, and when it severely compromises people's chances of regaining their rights and of reassuming their responsibilities in the foreseeable future."

This definition is complex. While it emphasizes the continuity existing between poverty and extreme poverty, it also relies on three main references which are more directly related to extreme poverty (Wodon, 1992, 1993). The first reference is that of a lack of one or several basic securities which may have a cumulative impact and lead to an insecurity affecting new dimensions in a poor person's or household's life. The second reference is that of time: extreme poverty is associated with the persistence of this insecurity over possibly long periods of time. The third reference is that of the inability of the extreme poor to exercise their (human) rights and assume their

[1] Joseph Wresinski (1914-1988) was a French Catholic priest. He founded ATD in 1957 in a slum near Paris. ATD is a non-confessional, non-profit grass-roots and advocacy organization at the origin of the United Nations' World day for overcoming poverty on October 17. Today, the organization runs grass-roots projects with the very poor in about 25 developed and developing countries. ATD also aims to represent the very poor in national and international fora. It has been granted consultative status 1 with the Economic and Social Council (ECOSOC) at the United Nations.

responsibilities. According to Wresinski, broad-based public policies dealing with the many areas of deprivation felt by the very poor were needed to help them emerge from extreme poverty. Moreover, Wresinski believed that the social exclusion in which the very poor live was as detrimental to their well-being as their lack of basic material security and income.

Our objective in this paper is to propose a definition of extreme poverty which takes into account two of the three references mentioned above: a) the multidimensionality of poverty and the possibility of interaction effects between different various deprivations, and b) the chronic character of extreme poverty, especially with respect to the fact that deprivations endured for long periods of time may be especially detrimental to the poor. We will not deal with the issue of the link between extreme poverty, human rights, and social exclusion (for a discussion of this link, see Wresinski, 1989, and Wodon, 2001).

Consider first the multidimensionality of poverty. The fact that poverty is a multidimensional phenomenon is now widely recognized among researchers and substantial work has gone into trying to define and measure this multidimensionality using both household level and aggregate data (e.g., Streeten, 1995; Cheli and Lemmi, 1995; Ravallion, 1996; Chakravarty, Mukherjee, and Ranade, 1998; Bourguignon and Chakravarty, 1999, 2003; Hirschberg, Maasoumi, and Slottje, 2001; Tsui, 2002; Dutta, Pattanaik, and Yongsheng, 2003, Duclos, Sahn and Younger, 2003; see also more generally the capabilities-functionings framework proposed by Sen, 1985, as well as the large literature on social exclusion in Europe, a recent example of which is Apospori and Millar, 2003)[2].

A general way to conceptualize multidimensional measures of poverty and well-

[2]The multidimensionality of poverty is also recognized by international organizations. While the United Nations Development Program has promoted multidimensional indices of well-being for some time in its annual Human Development Reports, the latest World Development Report on poverty also emphasized a broad approach to defining poverty, in dealing simultaneously with opportunity, security, and empowerment (World Bank, 2001). Nevertheless, in practice, most of the work on "extreme poverty" carried at the World Bank still relies in practice on unidimensional income or consumption-based measures, whereby those who cannot afford the cost of basic food needs are characterized as being extreme poor, while those who can afford the cost of the food necessary to reach nutritional requirements, but cannot afford both food and non-food basic needs, are characterized as being moderately poor.

being is to start by considering for each household a vector of attributes $x = (x_1, x_2, ..., x_n)$. Those attributes may be, for example, income, housing quality, school enrollment for children, health status, etc. If a poverty line (or basic needs threshold) were to be defined for each attribute, a household could be considered as poor if it had at least one attribute below the corresponding poverty line. This is the approach proposed by Tsui (2002) in his axiomatic derivation of the properties of multidimensional poverty measures, following similar work done previously by Foster and Shorrocks (1991) for unidimensional poverty measures.

An alternative approach proposed by Bourguignon and Chakravarty (2003) would be to consider as poor only those households that suffer from deprivations in all attributes. While the first approach uses an "union" approach to poverty, the second is based on an "intersection" approach. Both approaches enable the analyst to partition the total population into two disjoint sets: the poor and the non-poor, but of course the union approach will lead to a higher share of the population in poverty than the intersection approach. It is also feasible to provide more general frameworks which take into account both the intersection and union approaches (Duclos, Sahn and Younger, 2003).

In this paper, in order to deal with the multidimensionality of (extreme) poverty, we essentially rely on the union approach, but with a twist: we assume that there are interaction effects between different dimensions of well-being, so that deprivations for more than one attribute can have cumulative negative effects on a household's well-being. To our knowledge, taking into account these interaction effects explicitly has not be done so far.

In addition, we also propose to take into account the length of time during which households have suffered from various deprivations, with the idea that a longer deprivation is more detrimental than a shorter period. It is important to note that this assumption is different from the mainstream literature on chronic versus transient poverty. In that literature, the focus is often on whether households remain for more or less long periods of time in poverty, or on whether the income level of a household would over time and on average lead the household to be chronically poor or not. Here, our idea is rather than the length of a deprivation is itself an aggravating factor

that must be taken into account when measuring the extent of poverty. For example, a long period of unemployment or homelessness has an additional negative impact on households in terms of their ability to emerge from extreme poverty, and thereby on their well-being.

The originality of our approach, which again is based on lessons learned from grass-roots work by Wresinski (1987) and members of his organization, is thus to explicitly recognize the role of interaction effects and time in the definition and measurement of poverty. This is both very simple, and important, since one of the implications of such an approach is that more weight would probably be placed on the extreme poor in poverty measurement, which in turn would also probably place a higher weight on policy interventions designed to reach the extreme poor.

The rest of the paper is structured as follows. Section 2 reviews the basic core axioms used by Tsui (2002) in order to propose a multidimensional measure of poverty. Section 3 deals with the issue of the interaction effects between different types of deprivations or attributes in order to propose a specific measure of extreme poverty that takes these interaction effects explicitly into account. Section 4 shows that this specific measure of poverty obeys standard axioms related to the properties of transfers, namely Sen's (1997) Minimal Equity Axiom, and the properties of Pigou-Dalton transfers. Section 5 then extends the proposed measure of (extreme) poverty to take into account the time dimensions of various deprivations. A brief conclusion follows.

2 Basic Axioms

In this section, we simply follow Tsui's (2002) framework in order to propose a number of basic core axioms that multidimensional measures of poverty should obey. We consider a society of n individuals each of whom has a vector of K personal attributes. Let $x_i = (x_{i1}, x_{i2}, ..., x_{iK})$ represent this vector. The distribution of well-being in this society is summarized by a $n \times k$ matrix X whose ith row is x_i. Let $z = (z_1, z_2, ..., z_K)$ be a vector of deprivation thresholds. If $x_{ik} \leq z_k$, then the ith person is deprived in the ith attribute.

A first issue that we need to deal with relates to the identification of whom is poor. To deal with this issue in an unidimensional context, the analyst usually uses a poverty threshold, and considers as poor those with an indicator of well-being below that threshold. In a multidimensional context, the issue is more complex. Is a household deprived in one attribute but not in the others to be considered as poor? Or must the household be deprived in all the attributes (or perhaps a subset of them). There are two approaches in the literature to deal with this identification problem: the union approach, and the intersection approach. The union approach considers that a household is poor if it is deprived in at least one attribute. Under the intersection approach, a household is considered as poor if it is deprived in all attributes. Where does Wresinski's definition belong? According to Wresinski, "*A lack of basic security is the absence of one or more factors that enable individuals and families to assume basic responsibilities and to enjoy fundamental rights.*" This definition is more consistent with the union than with the intersection approach, in the sense that suffering from a deprivation in only one dimension may already be enough to be considered as poor. This leads us to give the following definition.

Definition 1 *For any $X \in \mathbb{R}_+^{n \times K}$ and $z \in \mathbb{R}_+^K$, the set of poor households is defined as $\Psi = \{i : x_{ik} \leq z_k \text{ for some } k\}$.*

A second issue when proposing a poverty measure relates to the aggregation problem, namely how to obtain an aggregate measure of poverty which summarizes, say for a country as a whole, the extent of the deprivation felt by various households. Tsui (2002) provides a list of six axioms that a unidimensional poverty measures are often assumed to satisfy: focus, symmetry, replication invariance, monotonicity, continuity, and subgroup consistency. The contribution of Tsui's paper was to extend these axioms to the multidimensional case as follows [3].

Axiom 2 ***Focus (FC).*** *P remains unchanged if any attribute such that $x_{ik} \geq z_k$ is increased.*

[3] As mentioned earlier, these axioms are a generalization to the multidimensional case of axioms in Foster and Shorrocks (1991) for unidimensional measures of poverty.

This axiom was first introduced in the poverty measurement literature by Sen (1976, 1981) in an unidimensional context. It implies that the poverty measure must be independent of the distribution of attributes above the deprivation thresholds.

Axiom 3 ***Symmetry (SM).*** $P(X,z) = P(\Pi X, z)$ *where* Π *is an* $n \times n$ *permutation matrix.*

This axioms implies that the name of the recipient of the attribute vector is irrelevant for the measurement of poverty. In other words, if a given household obtains the attributes of another household, and that other household gets the attributes of the first household, poverty will remain unchanged.

Axiom 4 ***Replication Invariance (RI).*** $P(X,z) = P(X^r, z)$ *where* X^r *is an* r*-time replication of* X*.*

This axiom was introduced in the literature by Chakravarty (1983) and Thon (1983). It means that if any two distributions of attribute X_0 and X_1 of different sizes are compared, and if one of those is a replication of the other, both distributions will have the same poverty.

Axiom 5 ***Monotonicity (MN).*** $P(X_o, z) \geq P(X_1, z)$ *whenever* X_1 *is derived from* X_0 *by increasing any one attribute with respect to which a household is deprived.*

This axiom is not very restrictive. Its main implication is that the poverty measure cannot increase if we improve one (or more) of the attributes of any household who is deprived. This axiom is important for "first order" poverty measures such as the poverty gap, for example.

Axiom 6 ***Continuity (CN).*** *For any* z*,* P *is a continuous function of* $X \in \mathbb{R}_+^{n \times K}$*.*

This axiom is necessary in order to avoid situations in which a marginal change in the deprivation of one household induces a large change in the poverty measure.

Axiom 7 ***Subgroup Consistency (SC).*** *For any n and k such that X_0 and Y_0 are $n \times k$ matrices and X_1 and Y_1 are $m \times k$ matrices, with $X^T := \left[X_0^T, X_1^T\right]$, and $Y^T := \left[Y_0^T, Y_1^T\right]$, $P(X,z) > P(Y,z)$ whenever $P(X_0,z) > P(Y_0,z)$ and $P(X_1,z) = P(Y_1,z)$.*

This axiom adapts the subgroup consistency axiom proposed by Foster and Shorrocks (1991) to the case of multidimensional poverty The axiom implies that aggregate poverty cannot increase when poverty decreases for a population subgroup. As noted by Foster and Shorrocks (1991), this axiom is useful for example to assess the effects of decentralized strategies of poverty alleviation. Indeed, if the poverty index were to not be subgroup consistent, it could be the case that a successful local effort to reduce poverty for a population subgroup would induce an increase in aggregate poverty.

Given the above first five axioms, Tsui (2002) showed that a poverty measures will satisfy SC if and only if it has the following structure

$$P(X,z) = F\left[\frac{1}{n}\sum_{i=1}^{n} p(x_i,z);z\right], \tag{1}$$

with F being strictly increasing and continuous.

3 Interaction Effects

Our objective in this paper is to define a subclass of (1) in which the poverty indices will capture the main suggestions proposed by Wresinski to characterize the extreme poor. Wresinski argues that "*Extreme poverty results when the lack of basic security simultaneously affects several aspects of people's life.*" According to Wresinski, poverty results from, and even consists of, a lack of basic securities which include not only financial resources, but also education, employment, housing, health care, etc., as well as in some cases a lack of ability to exercise civil and political rights. This is very much in line with the above multidimensional approach to defining poverty.

But there is more. Wresinski suggests that beyond some threshold, the insecurity endured by the poor is such that the lack of basic securities have mutually

reinforcing impacts. There are, in other words, interaction effects between various deprivations, so that when the consequences of the insecurity are severe, this may lead to deprivations in new life areas. The poor are then prisoners of a vicious circle. With no basic security left as a solid foundation to rely upon, they cannot emerge from chronic poverty by themselves. This cumulative deprivation does not refer to the juxtaposition of characteristics associated with, say, the inhabitants of innercity ghettos, urban slums, and remote areas. It should not be confused either with the high incidence of poverty which can be found in these areas. The cumulative lack of basic securities is to be understood as representing the situation of individuals or households who cannot emerge from poverty without the help of others because the pressure of deprivation is just too strong in too many areas.

One example may help to better understand what is meant by interaction effects. Consider a household whose head has been unemployed for some time, and is not eligible for unemployment benefits. The lack of income for the head has led the households to be expelled from their housing unit because they could not pay their rent. Once the household becomes homeless, it becomes even more difficult for the head to find work, because he can't easily take a shower and be ready for work, because he may have become sick by being forced to live in substandard housing, or maybe because the need to find a temporary shelter has led the household to move to the outskirts of a city where transportation is not easily available. Such circumstances happen regularly in real life, and they demonstrate how deprivations in one attribute have spillover effects on other attributes.

There is a link between the emphasis placed by Wresinski on the interaction effects between various types of deprivation and a suggestion by Sen (1997) that welfare measures should respect an axiom of minimal equity. This axiom states that, if two households have the same income and if one of them has a higher level of needs, then a transfer from the less needy household towards the other should increase welfare and reduce inequality. We can adapt Sen's idea in the context of interaction effects under multidimensional poverty measures with the following axiom.

Axiom 8 ***Minimal Equity (ME).*** *If* $x_{il} > x_{jl}$, $x_{ik} = x_{jk} \;\; \forall k \neq l$ *and if there is at*

least on attribute m such that $x_{im} = x_{jm} < z_m$, then a marginal transfer of the mth attribute from i to j should reduce poverty.

Again, what the ME axiom says is that even if two households have the same level of well-being in one or more attributes, if one household is better off in another attribute (an not worse off in another attribute), then a transfer from the better off households to the household less well off should reduce poverty, or at least not increase it. As a specific case of the Minimal Equity Axiom, we can also propose the following Interaction Axiom.

Axiom 9 ***Interaction (IA).*** *Consider three vectors of personal attributes x_h, x_i and x_j. If x_h is such that $x_{hk} < z_k$, $x_{hl} < z_l$ and $x_{hm} > z_m$ for all $m \neq k$ or l, if x_i is such that $x_{ik} = x_{hk}$ and $x_{im} > z_m$ for all $m \neq k$ and if x_j is such that $x_{jl} = x_{hl}$ and $x_{jm} > z_m$ for all $m \neq l$ then $p(x_h, z) > p(x_i, m) + p(x_j, m)$.*

What the interaction axiom says is that the contribution to the overall poverty measure of a household with deprivations in several areas will be larger than the contribution that this household would bring to overall poverty if each deprivation was taken into account separately, assuming that the household does not suffer from a another deprivation.

Now, in order to propose a specific measure of (extreme) poverty, assume now that the deprivation of household i in the kth attribute is given by

$$g_{ik}(x_{ik}, z_k) = \max\left(\frac{z_k - x_{ik}}{z_k}, 0\right), \tag{2}$$

and consider the following transformation of the Foster, Greer and Thorbecke (1984) class of poverty indices

$$\begin{aligned} P_W(X; z, \alpha) &= \frac{1}{n}\sum_{i=1}^{n}\left[g_i(x_i, z)\right]^{\alpha} \qquad (3)\\ \text{where } g_i(x_i, z) &= \sum_{k=1}^{K}\gamma_k g_{ik}(x_{ik}, z_k) + \sum_{k=1}^{K}\sum_{l=k+1}^{K}\gamma_{kl} g_{ik}(x_{ik}, z_k)\, g_{il}(x_{il}, z_l), \\ 1 &= \sum_{k=1}^{K}\gamma_k + \sum_{k=1}^{K}\sum_{l=k+1}^{K}\gamma_{kl}, \\ \alpha &> 0,\ \gamma_k > 0 \text{ and } \gamma_{kl} > 0 \text{ for all } k \text{ and } l. \end{aligned}$$

Proposition 10 *P_W satisfies FC, SM, RI, MN, CN, SC and IA.*

Proof. From Proposition 1 in Tsui (2002) we know that P_W satisfies *FC*, *SM*, *RI*, *MN*, *CN*, *SC*. Consider now x_h, x_i and x_j as defined in Axiom 9. From (3) ad (2), we have $g_h^\alpha > g_i^\alpha + g_j^\alpha$, P_W thus satisfies *IA*. ■

4 Pigou-Dalton Transfers

The poverty measure (3) satisfies all the axioms presented so far. But does it have other desirable properties? One commonly used principle in welfare measurement is the Pigou-Dalton transfer principle. In an unidimensional framework, this principle stipulates that a transfer from a poor to a richer household increases poverty. In a multidimensional framework, Tsui (2002) proposed to restate this definition of this principle in the following fashion.

Definition 11 *For any n, let any $n \times n$ matrix T be referred as a Pigou-Dalton transfer matrix whenever $T = \lambda I + (1-\lambda)Q$, $0 < \lambda < 1$, I is an $n \times n$ identity matrix and Q is an $n \times n$ permutation matrix interchanging two coordinates of any vector.*

The operation implied by premultiplying a matrix of attribute X by a Pigou-Dalton transfer matrix T is that an attribute of two households will be shared and redistributed among them, which implies a transfer from the better off household to the household that is worst off.

Definition 12 *Let $\Im := \bigcup_n \Im(n)$, where $\Im(n)$ is the class of $n \times n$ Pigou-Dalton transfer matrix, then X_1 is a uniform Pigou-Dalton Transfer of X_0 if and only if $X_1 = VX_0$, where $V \in \Im$.*

Building on the above two definitions, Tsui (2002) gives a weak version of Donaldson and Weymark's (1986) minimal transfer axiom for a multidimensional framework[4].

[4]Note that Tsui (2002) gives two versions of this axiom based on a majorization criterion. Since we only use the Pigou-Dalton criterion in this paper, it is not necessary for us to introduce the distinction.

Axiom 13 ***Poverty Non-increasing Minimal Transfer Axiom (PNMT).*** $P(X_1, z) \leq P(X_0, z)$ *if* X_1 *is a Pigou-Dalton Transfer of* X_0 *and if at least some transfers occur among the poor.*

The question is then whether our proposed poverty measure (3) respects PNMT.

Proposition 14 P_W *satisfies ME. If* $\alpha \geq 2$*, it also satisfies PNMT.*

Proof. Note that

$$\frac{\partial P_W}{\partial x_{ik}} = \frac{\alpha}{n} g_i^{\alpha-1} \left\{ -\frac{1}{z_k} \left[\gamma_k + \sum_{l \neq k} \gamma_{kl} g_{il} \right] \right\} < 0$$

and that

$$\frac{\partial^2 P_W}{\partial x_{ik} \partial x_{il}} = \frac{\alpha}{n} g_i^{\alpha-1} \frac{\gamma_{kl}}{z_k z_l} > 0.$$

P_W thus satisfies *ME*. Using Proposition 3 from Tsui (2002) and noting that g_i^α is convex implies that P_W also satisfies *PNMT*. ■

5 Length of Deprivation

Consider now another characteristic of extreme poverty according to Wresinski, namely the chronic character of extreme poverty, or its persistence through time. A common feature among the extreme poor is the permanence, or at least the recurrence of their situation. Apart from the plurality in areas of life or attributes affected, the chronically poor share a history of deprivation. In fact, as poverty is associated with social exclusion from mainstream society and, for the poorest, from their community in many cases as well, the chronically poor also suffer from a high degree of economic, social, and cultural isolation which may at times be transmitted from one generation to the next. More generally, the longer the experience of poverty has been, the harder it is to emerge from poverty. One example relates to employment: the longer a person has been unemployed, the harder it is for that person to find new work. Another example relates to homelessness: the longer a person or household has been homeless, the harder it is for this household to obtain new housing.

Of course, the length of a deprivation may also have an impact on other types of deprivations. For example, a longer period of homelessness will tend to affect more seriously other attributes such as the health status of the household members. But this type of effect is already considered through the multidimensional nature of the poverty measure here and the interaction effects proposed in the previous section. The argument presented here is that the duration of a deprivation in and by itself may (at least for some attributes) increase the level of deprivation of a household.

To formalize this idea, let's assume that household deprivation is time dependent, so that $g_i(x_i, t_i, z)$ where $t_i = (t_{i1}, t_{i2}, ..., t_{iK})$ represents the vector of duration since the beginning of various deprivations. The length of various deprivations in a society can be represented by a $n \times k$ matrix T whose ith row is t_i. Let's also define a vector $\overline{t} = (\overline{t}_1, \overline{t}_2, ..., \overline{t}_k)$ of maximum time thresholds representing the time necessary for various deprivation to reach its maximum negative impact on poverty (beyond these time thresholds, additional time under deprivation does not have an additional negative impact). We then propose the following axiom.

Axiom 15 ***Time Dependence (TD).*** *$g_i(x_i, t_i^1, z) > g_i(x_i, t_i^0, z)$ whenever $t_i^1 \geq t_i^0$ with at least one attribute k for which $t_{ik}^1 > t_{ik}^0$ for $t_{ik}^0 < \overline{t}_k$.*

In order to take this axiom into consideration in our proposed measure of poverty, we define the following time dependant weights

$$\begin{array}{c} \gamma_k(t_{ik}) \in [0, \overline{\gamma}_k] \quad \text{for } t_{ik} \leq \overline{t}_k \\ \gamma_k(t_{ik}) = \overline{\gamma}_k \quad \text{for } t_{ik} > \overline{t}_k \end{array} \tag{4}$$

and

$$\begin{array}{rcl} \gamma_{kl}(t_{ik}, t_{il}) & \in & [0, \overline{\gamma}_{kl}] \quad \text{when } t_{ik} \leq \overline{t}_k \text{ or } t_{il} \leq \overline{t}_l \\ \gamma_{kl}(t_{ik}, t_{il}) & = & \overline{\gamma}_{kl} \quad \text{when } t_{ik} > \overline{t}_k \text{ and } t_{il} > \overline{t}_l \end{array} \tag{5}$$

We will assume the following properties for these weights

$$\frac{\partial \gamma_k}{\partial t_k} \geq 0, \quad \frac{\partial \gamma_{kl}}{\partial t_k} \geq 0 \text{ and } \frac{\partial \gamma_{kl}}{\partial t_l} \geq 0. \tag{6}$$

Given these weight, it is straightforward to generalize (3) into the following measure of (extreme) poverty:

$$\begin{aligned} P_{WT}(X,T;z,\alpha) &= \frac{1}{n}\sum_{i=1}^{n}\left[g_i(x_i,t_i,z)\right]^{\alpha} \qquad (7)\\ \text{where } g_i(x_i,t_i,z) &= \sum_{k=1}^{K}\gamma_k(t_{ik})\,g_{ik}(x_{ik},z_k)+\sum_{k=1}^{K}\sum_{l=k+1}^{K}\gamma_{kl}(t_{ik},t_{il})\,g_{ik}(x_{ik},z_k)\,g_{il}(x_{il},z_l),\\ 1 &= \sum_{k=1}^{K}\overline{\gamma}_k+\sum_{k=1}^{K}\sum_{l=k+1}^{K}\overline{\gamma}_{kl}\\ \text{and } \alpha &> 0. \end{aligned}$$

Proposition 16 *P_{WT} satisfies FC, SM, RI, MN, CN, SC, IA, ME and TD. For $\alpha \geq 2$, it also satisfies PNMT*

Proof. Given (4), (5) and (6), P_{WT} satisfies *TD*. The rest follows from Proposition 10 and Proposition 14. ■

6 Conclusion

Following Sen's work on capabilities and functionings, there is now some sympathy for multidimensional conceptualizations of poverty. However, the available approaches to take into account the multidimensionality of poverty do not take into account the fact that households who suffer from multiple handicaps tend to have lower levels of well-being. The impact of the duration of such handicaps on well-being is also not factored into traditional poverty measurement. In this paper, we have tried to take these aspects into account in providing a new definition of extreme poverty that formalizes some of the intuitions provided by Wresinski after a lifelong experience of working with very poor families around the world.

It could perhaps be argued that the assimilation of (extreme) poverty to the lack of several basic securities results from a confusion. Poverty when conceived as a unidimensional monetary (consumption- or income-related) phenomenon may very well result from deprivations in other areas (such as a lack of education or employment), or

it may very well cause such deprivations, especially through inter-generational transmission mechanisms. But this would be no rationale for identifying the causes and/or consequences of poverty with poverty itself. There would be "double counting" in such a multidimensional approach to poverty, since both the causes and consequences of the phenomenon would be included in the same measurement tool.

At the extreme, by lumping together populations with various types of deprivations, such as the jobless, the homeless, the illiterate, the disable, etc., in a common multidimensional poverty measure, the resulting concept of poverty would lose its precision and usefulness for public policy. The concept of multidimensional poverty could for example lead to the possibly mistaken impression that a vaguely defined and articulated concept of comprehensive policy for poverty reduction might be more effective in bringing an end to the various deprivations identified by analysis than more specific and targeted interventions for each deprivation area.

This type of objections is important, and it certainly has some validity. Yet the fact that a multidimensional view of poverty might be misused does not detract from its relevance to describe existing conditions for the very poor. Again, to take just one example, there are clear relationships between homelessness and joblessness among the very poor, with both phenomenons reinforcing each other and often leading to a vicious circle. This is typically not taken into account in traditional measures of poverty, even when they are multidimensional, because interaction (and time) effects are not explicitly taken into account.

There is something fundamentally true about a multidimensional and cumulative approach to poverty, and the adequacy of this approach is probably most evident when one considers the life of the extreme poverty rather than that of those who are less poor. The position defended in this paper according to which a cumulative lack of several basic securities limits the possibility for people to live decently and emerge from their condition of deprivation does provide what we believe is a faithful representation of the situation of many very poor individuals and households around the world. If the situation of these individuals and households were one of financial deprivation only, it could be referred to as such, and dealt with through public transfers. But it is not, and the concept of multidimensional poverty, especially with interaction

and time effects, enables the analyst/policy maker to capture what goes on in the life of very poor individuals and households beyond the lack of income. Beyond helping in designing appropriate policies, such an approach to poverty could also help for prevention, that is for avoiding that poverty repeat itself from one generation to the next among the very poor.

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