Multidimensional poverty: theory and empirical evidence

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Twelfth winter school on Inequality and Social Welfare Theory (IT12)

CED
Centre d'Estudis Demogràfics

Job announcement

- A postdoctoral appointment is offered for a social scientist with excellent analytical and writing skills that has recently completed his/her PhD or will complete in Spring 2017. The candidate will join the project "Equalizing or disequalizing? Opposing socio-demographic determinants of the spatial distribution of welfare", funded by the European Research Council as a Starting Grant to Dr. Iñaki Permanyer and hosted by the Center for Demographic Studies (CED) in Barcelona.

- Aspiring candidates should be highly motivated and have a solid background in Demography and/or Economics. Researchers interested in Sociology of Stratification, Global Inequality and Poverty or related fields are encouraged to apply. Preference will be given to candidates with strong quantitative and writing skills. The candidate will be invited to develop his/her own research agenda within the broad scope of the project's goals.

- The selected candidate should join the project in 2017, preferably before summer. We offer a 2 years contract. The salary will be commensurate with experience and in line with the standard postdoctoral positions in the Spanish research system. There are no teaching obligations involved.

erc European Research Council

Motivation

- Well being is multidimensional (e.g. standard of living, education, health,…).
- Market prices are imperfect or non-existent for some of its dimensions.
- Increasing popularity
  - Stiglitz-Sen-Fitoussi report
  - UN's Multidimensional Poverty Index
  - EU AROPE index.

Uni-dimensional poverty

- Following Sen (1976)

1. Well-being measurement: “Poverty of what?”

2. Identification of the poor

3. Aggregation

Well-being measurement: “Poverty of what?”

- Utility
  - Problems with adaptive preferences
- Capabilities
  - Attempt to go beyond “opulence approach”.
- **Income/Consumption**
  - The standard and most widely used approach in empirical research.
- …

Identification of the poor

- Absolute thresholds
  - Minimum / basic needs approach
- Relative thresholds
  - Reference group
- Weakly relative thresholds (Ravallion and Chen).

Aggregation

- Huge literature on poverty measures
- Foster-Greer-Thorbecke (FGT): the most popular family of indices

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{n}\left(\max\left\{0, \frac{z - x_i}{z}\right\}\right)^\alpha$$

When α=0 → Headcount ratio (H)

When α=1 → Poverty gap index

When α=2 → Inequality sensitive

Poverty orderings

- Poverty orderings require unanimous poverty rankings for a class of poverty measures or a set of poverty lines.
- The need to consider multiple poverty measures and multiple poverty lines arises inevitably from the arbitrariness inherent in poverty comparisons.
- The approach aims at comparing distribution pairs, but not at quantifying the extent of poverty.

Multidimensional poverty (I)

- Individual’s well-being is conceptualized taking several attributes at the same time. Grounded in Sen’s Capability Approach.
- Functionings vs Capabilities

Multidimensional poverty (II)

- Lots of **additional** implementation problems
  - List of functionings to be included
  - Measurement scales and commensurability
  - Data availability
  - Identification of the poor
  - Aggregation
    - Combining several dimensions at the same time
    - Weights
    - **Relationship between pairs of different variables**

Structure of the presentation

- Introduction ✓
- Multidimensional poverty indices
  - Identification
  - Aggregation
- Empirical evidence
- Conclusions

Identification of the poor

Identification of the poor

- Essential for the success of any poverty eradication program.
- Relatively simple in the single dimensional case (draw a poverty line…).
- **Unsatisfactorily addressed in the multidimensional (MD) case.**

Existing approaches in the MD case

Separate distributions

↓

Indicator dashboard

Indicator dashboard

Indicator dashboard

Ignores joint distribution, fails to identify the multiply deprived.

Existing approaches in the MD case

Separate distributions

↓

Indicator dashboard

Joint distribution

Poverty frontier (work in the achievements space)

Multiple Deprivations (work in the deprivations space)

↓

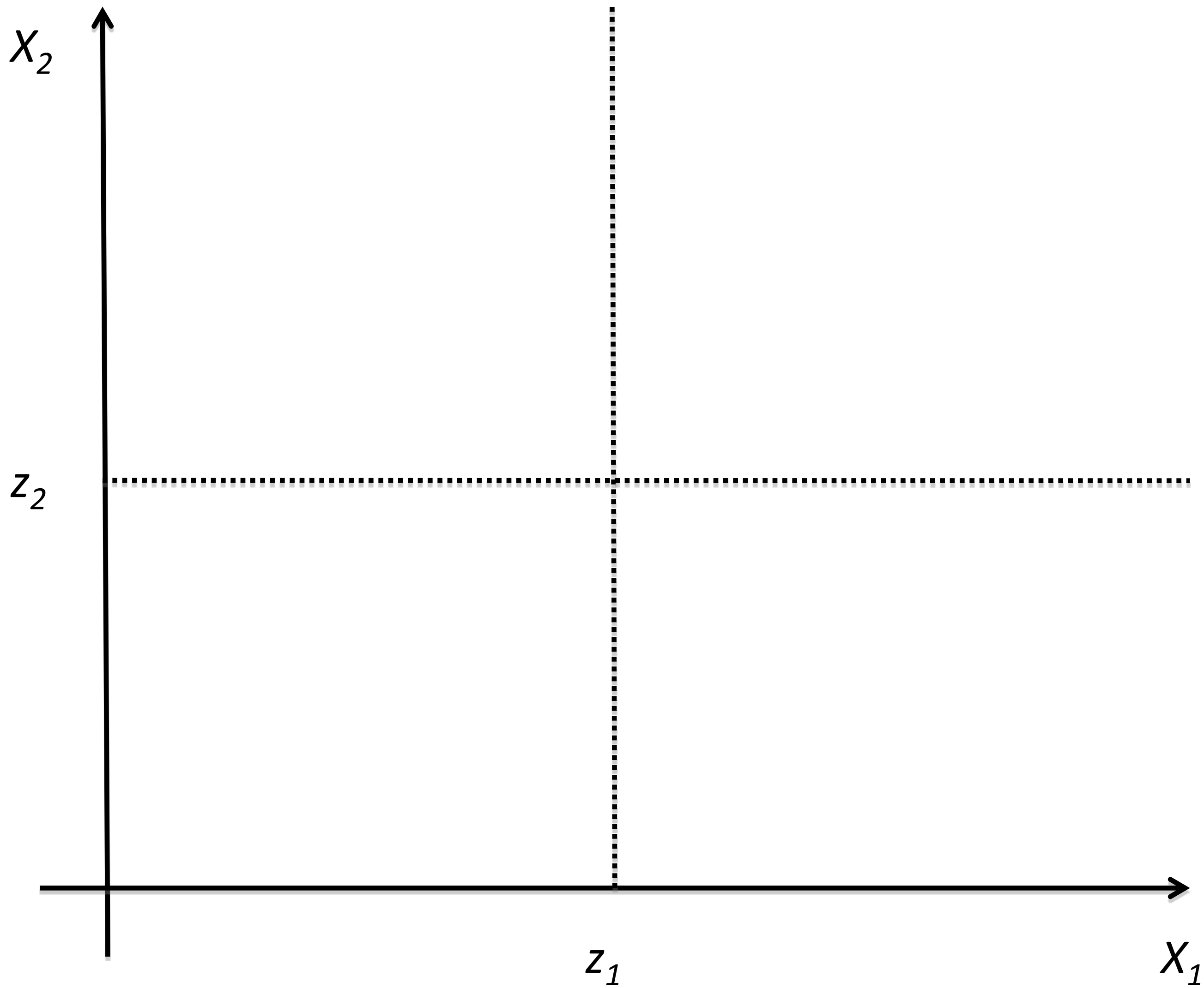
Counting approaches

Union approach

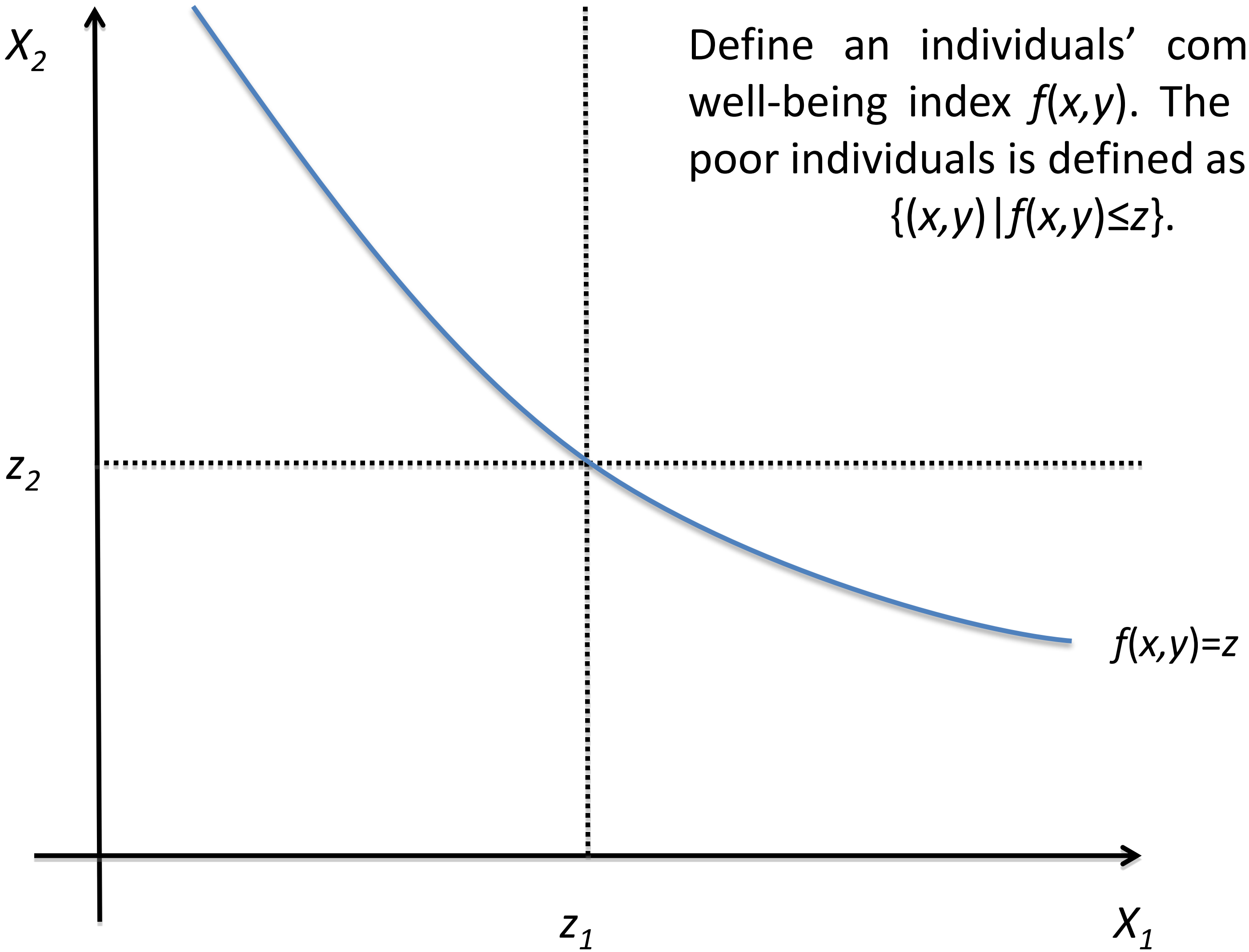
Intersection approach

Intermediate approach

Joint distribution: Who is poor?



Poverty Frontier



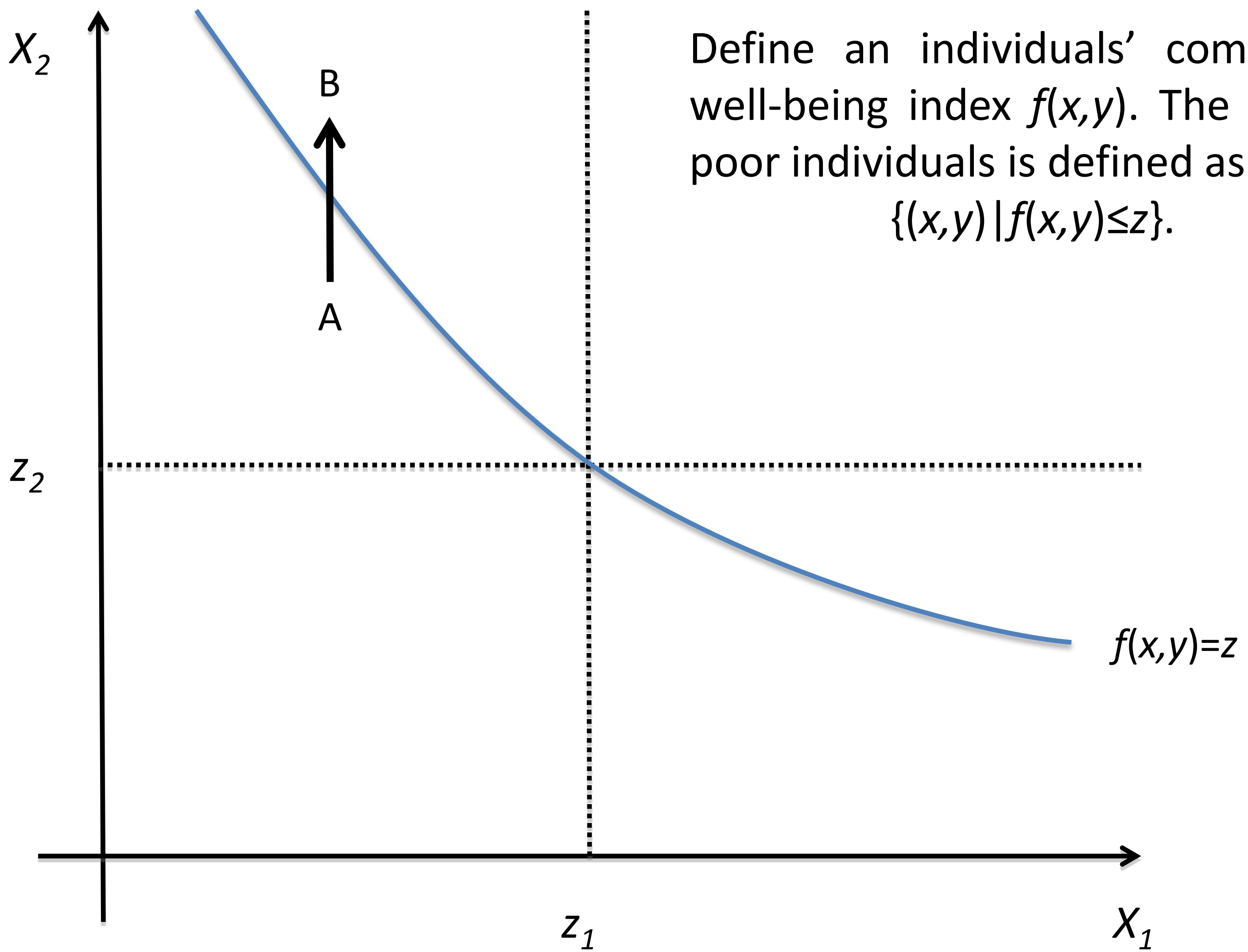
Define an individuals' composite well-being index $f(x,y)$. The set of poor individuals is defined as

$$\{(x,y)\,|\,f(x,y)\leq z\}.$$

Poverty frontier

- Reduces the multidimensional measure to a single-dimensional one.
- One can pull out of poverty individuals by increasing some non-deprived attributes, while keeping fixed the ones in which they are deprived.

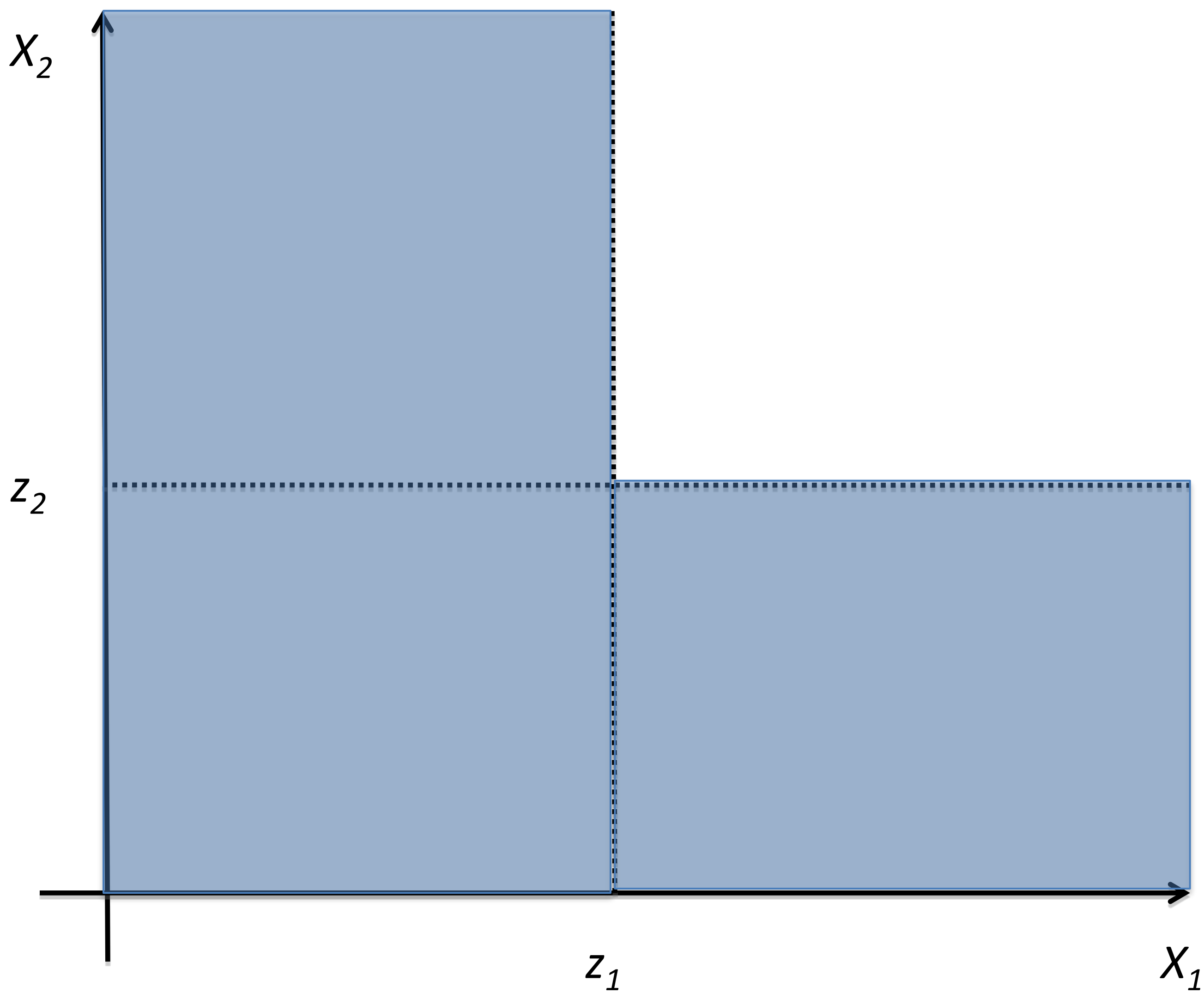
Poverty Frontier



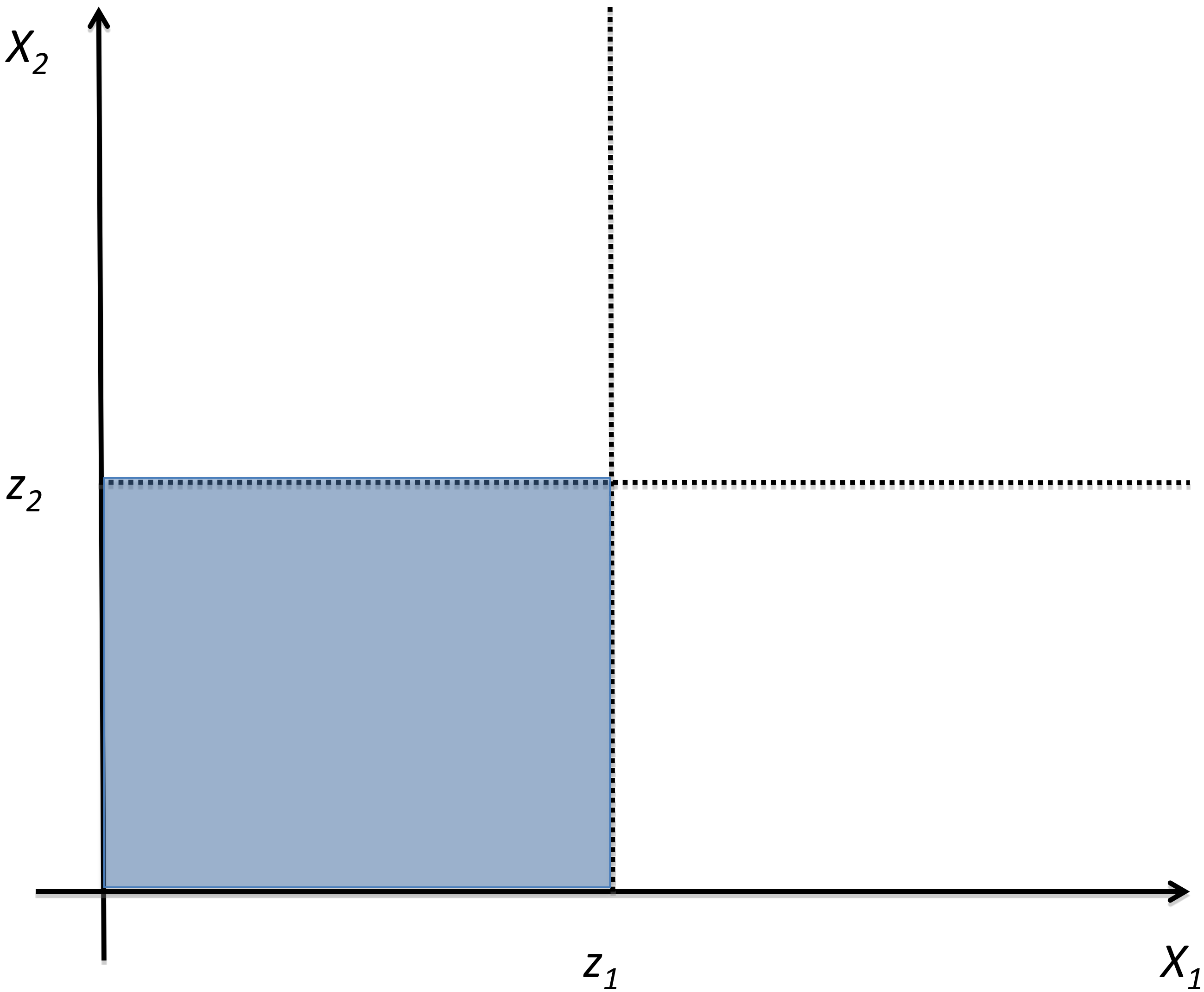
Define an individuals' composite well-being index $f(x,y)$. The set of poor individuals is defined as

$$\{(x,y)\,|\,f(x,y)\leq z\}.$$

Counting approaches: Union



Counting approaches: Intersection

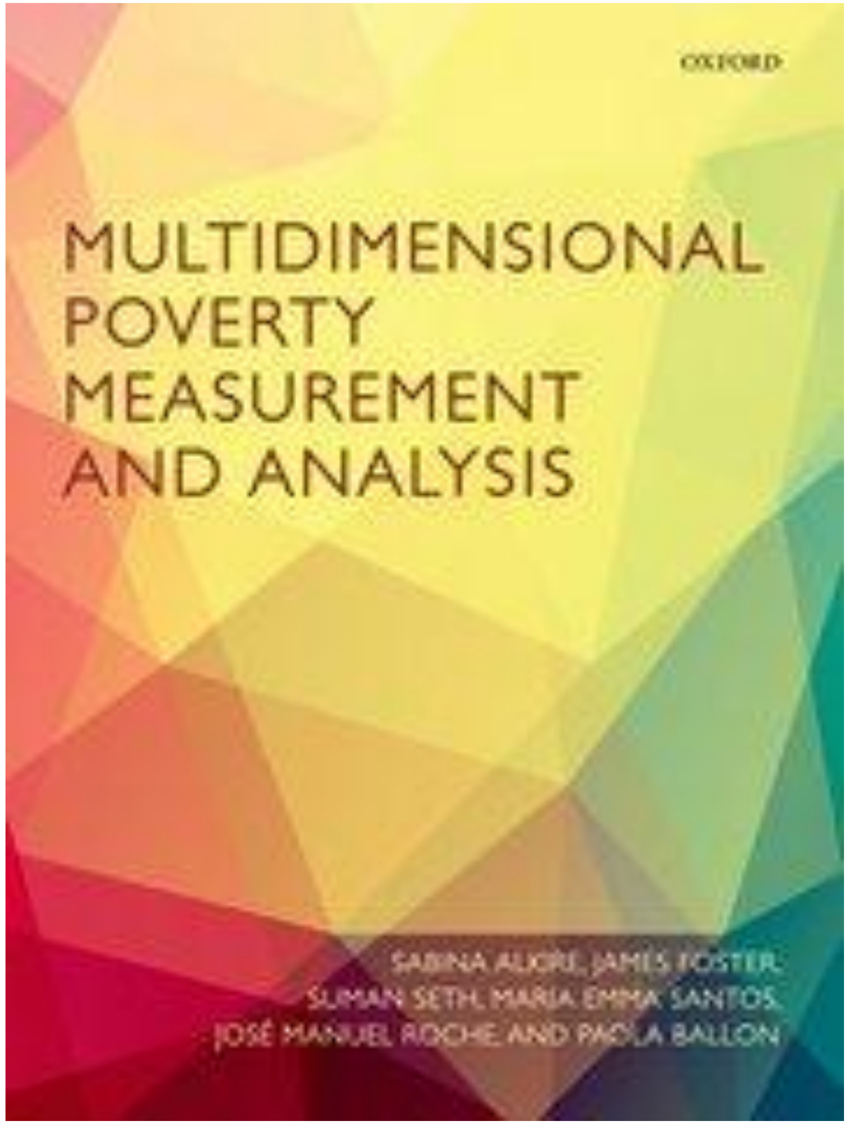


General counting approach

- Assume there are *d* dimensions, each of which with the corresponding poverty threshold z_j. We can **count** the number of dimensions in which an individual '*i*' is deprived (c_i).
- The counting approach fixes a number *k* ($1 \leq k \leq d$) and an individual '*i*' is labeled as 'poor' whenever $c_i \geq k$.
  - If k=1: Union approach
  - If k=d: Intersection approach

Counting approach

- State-of-the-art methodology in multidimensional poverty measurement.



Oxford University Press 2015

Counting approach

- State-of-the-art methodology in multidimensional poverty measurement.
- Deprivations are stacked together no matter how as long as their (weighted) sum adds up to a certain threshold (k).
- For instance: If d=4 ({A,B,C,D}),k=2 and equal weights apply, anyone deprived in any two dimensions is "poor":

{AB, AC, AD, BC, BD, CD}

Counting approach

- The counting approach fails to take into consideration the nature of the variables one is dealing with.
- It is related to the **Non-Preference Based** axiomatic literature on freedom (Pattanaik and Xu 1990).
- It ignores eventual relationships and interactions between different groups of variables (complementarity / substitutability issues).

Axiomatic characterization

Notation and definitions

- N: Set of individuals $|N|=n$.
- D: Set of dimensions $|D|=d$.
- For each individual *i* we consider her *achievement vector*

$$\boldsymbol{y}_i=(y_{i1},\ldots,y_{id})$$

(where $y_{ij} \in I_j$) and a vector of poverty thresholds $z=(z_1,\ldots,z_d)$.

Identification functions

$$\zeta : (I_1 \times \cdots \times I_d) \times (I_1 \times \cdots \times I_d) \to \{0,1\}$$

$\zeta(\boldsymbol{y}_i, z)=1$ if person i is poor and 0 otherwise

Let $X^d:=\{0,1\}^d$. We decompose ζ as $\zeta = \rho \circ w$

$$\omega : (I_1 \times \cdots \times I_d) \times (I_1 \times \cdots \times I_d) \to X^d$$

(within dimensions identification function)

$$\rho : X^d \to \{0,1\}$$

(between dimensions identification function)

$$\Omega_d := \{\rho : X^d \to \{0,1\}\}$$

Notation and definitions

Set of **deprivation profiles:** $X^d = \{0,1\}^d$

Set of **poor profiles**

$$P_\rho := \{\mathbf{x} \in X^d | \rho(\mathbf{x}) = 1\} = \rho^{-1}(1)$$

Set of **non-poor profiles**

$$R_\rho := \{\mathbf{x} \in X^d | \rho(\mathbf{x}) = 0\} = \rho^{-1}(0) = X^d \backslash P_\rho.$$

Examples of sets of poor and non-poor profiles

$$P_{d,C(\mathbf{a},k)} \; : \; = \left\{ \mathbf{x} \in X^d \middle| \sum_{j=1}^{j=d} a_j x_j \geq k \right\}$$

$$R_{d,C(\mathbf{a},k)} \; : \; = \left\{ \mathbf{x} \in X^d \middle| \sum_{j=1}^{j=d} a_j x_j < k \right\}$$

Sets of poor and non-poor profiles according to the counting approach ('Alkire-Foster approach').

A partial order in X_d

- The elements in the set of deprivation profiles can be partially ordered by vector dominance:

  For any $\boldsymbol{x},\boldsymbol{y} \in X^d$, $\boldsymbol{x} \leq \boldsymbol{y}$ if and only if $x_i \leq y_i$ for all i.
- Let Z be any subset of X^d.

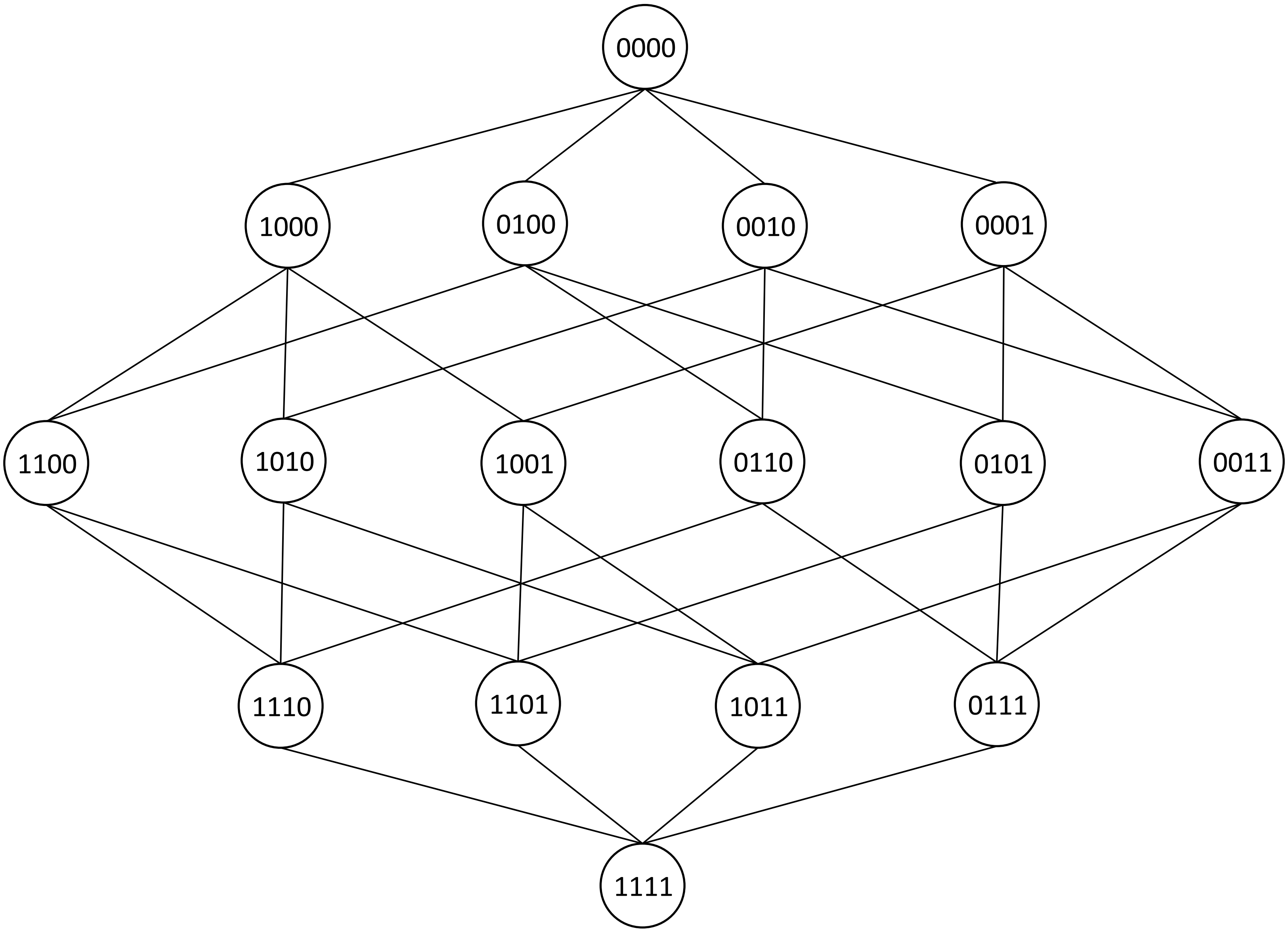
  The set of **least deprived elements** of Z is:

$$\mathcal{L}(Z) := \{\mathbf{x} \in Z | \nexists \mathbf{y} \in Z \setminus \{\mathbf{x}\} \text{ s.t. } \mathbf{y} \preceq \mathbf{x}\}$$

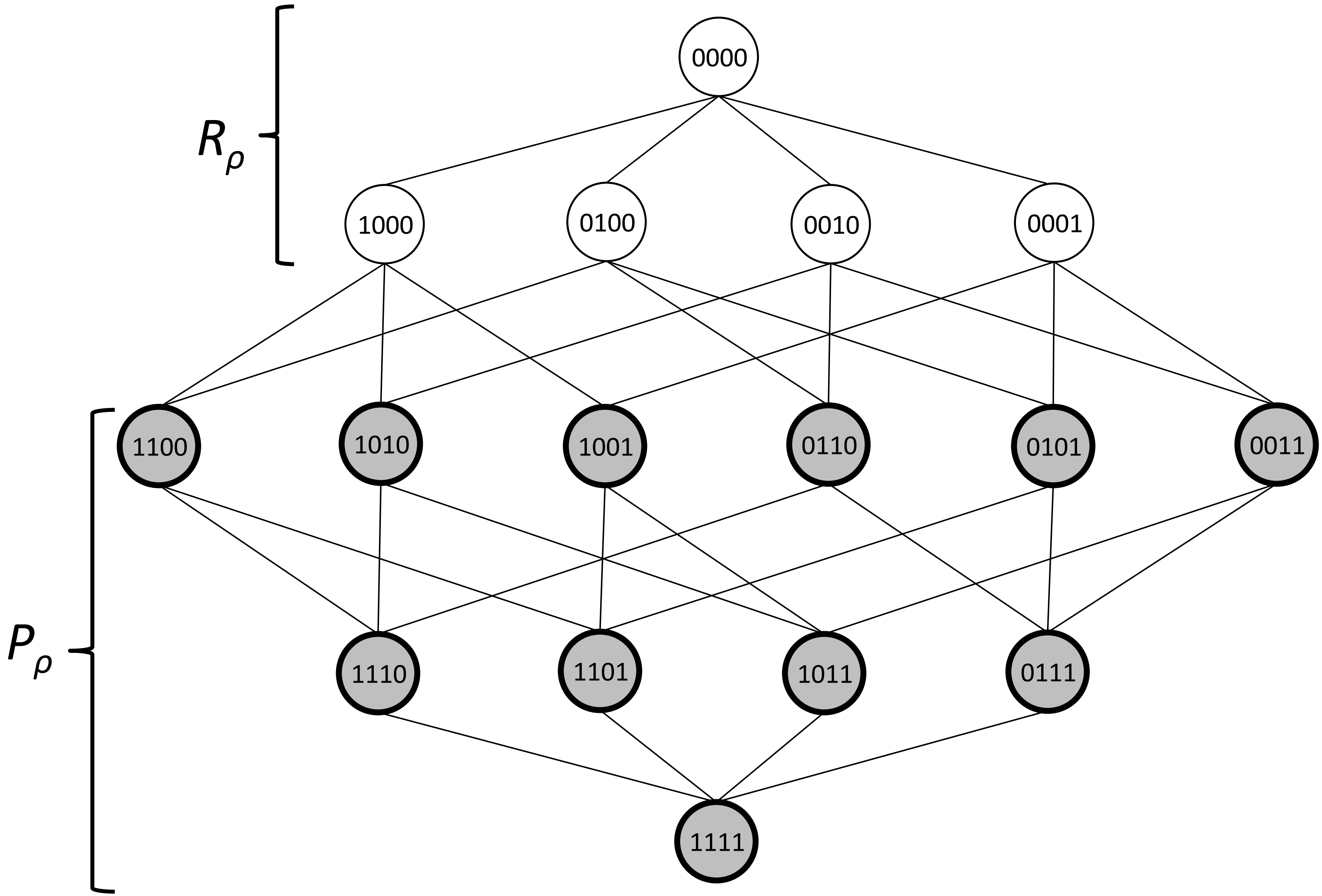
The **up-set** of Z is:

$$Z^{\uparrow} := \{\mathbf{x} \in X^d | \exists \mathbf{z} \in Z \text{ s.t. } \mathbf{z} \preceq \mathbf{x}\}$$

Hasse diagrams



An identification function



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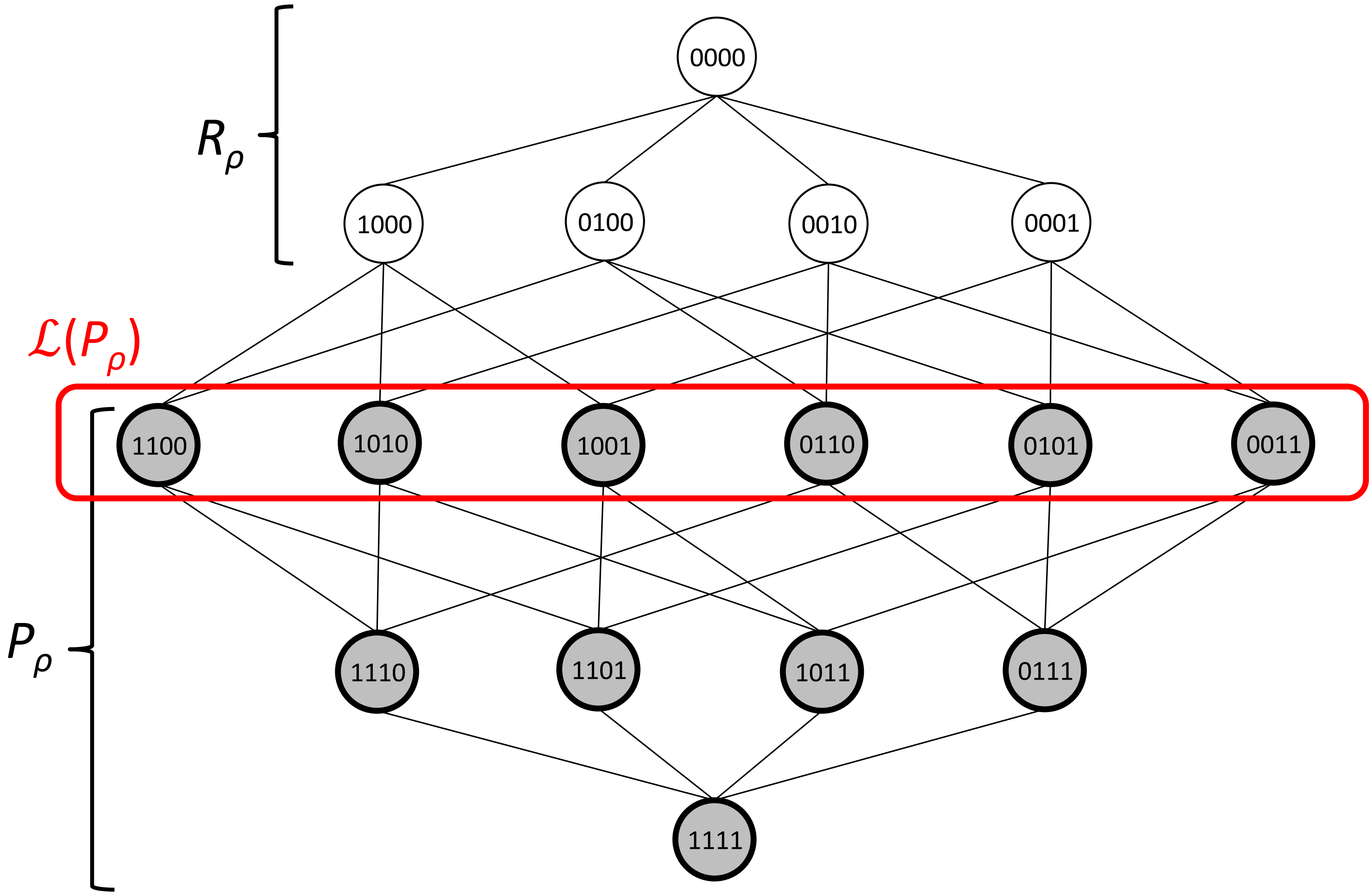
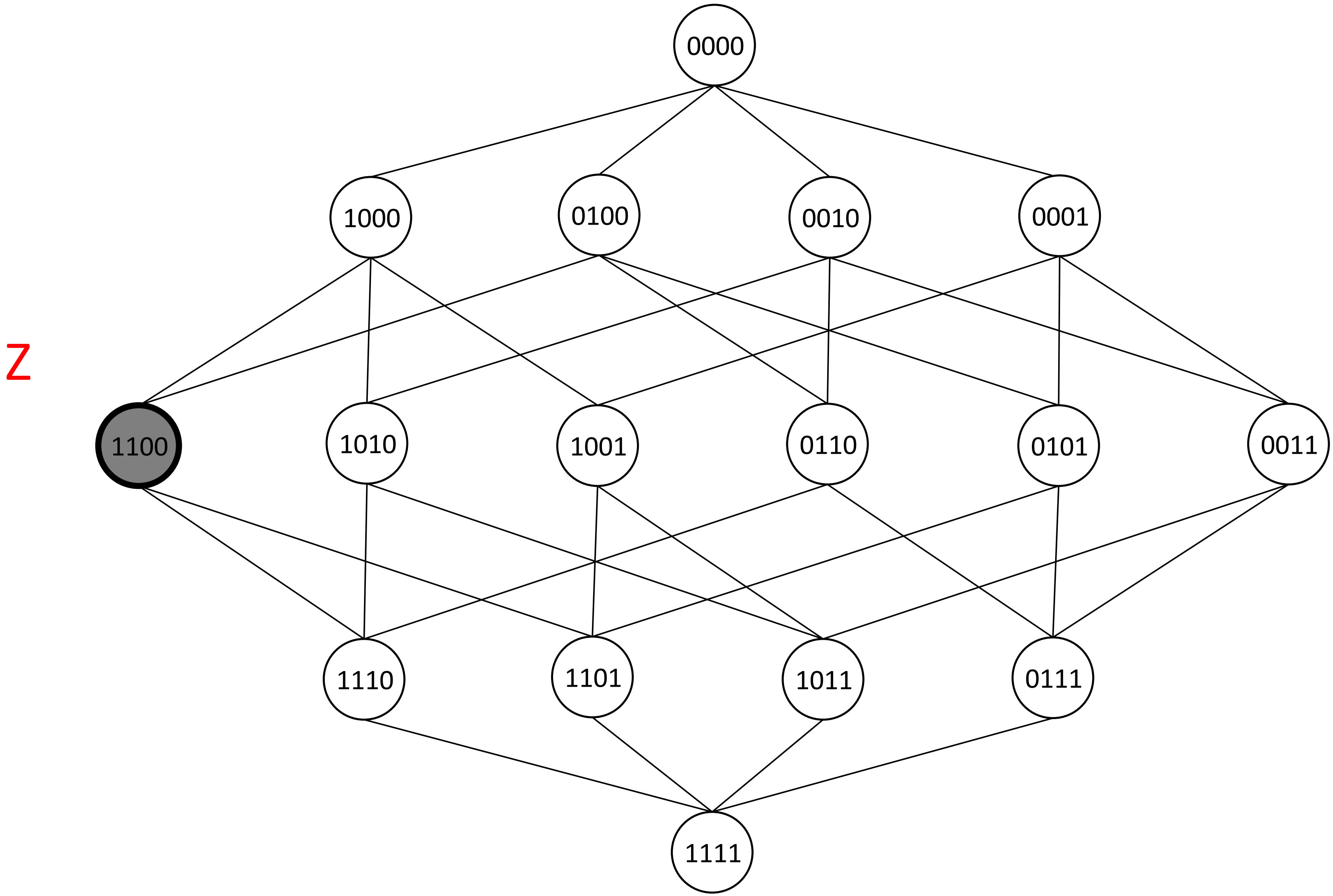


The up-set of Z



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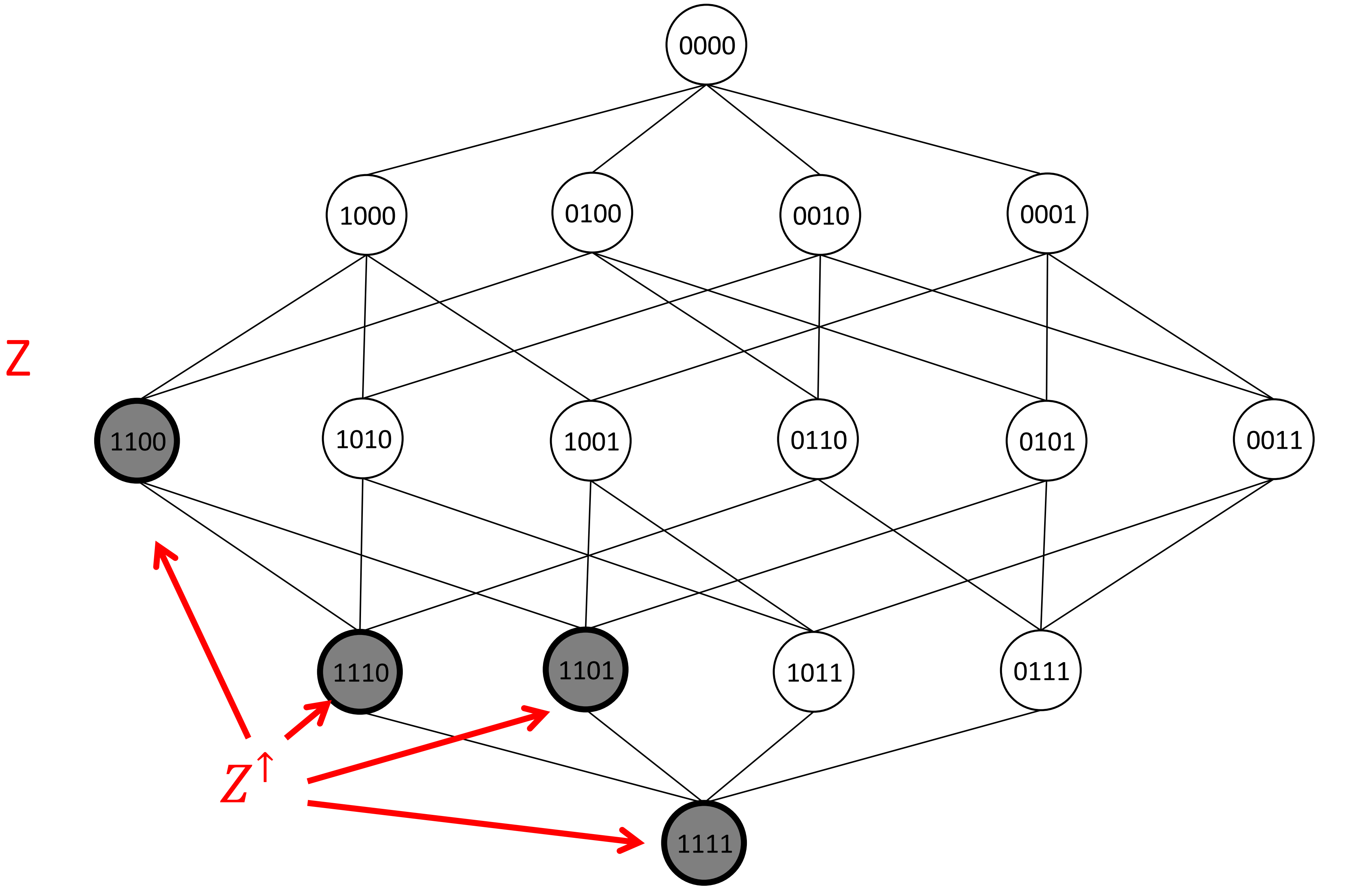

Axiomatic characterization of ρ (1)

Let $S_d \subseteq \Omega_d$ be a set of $d-$dimensional identification functions.

Non-triviality (NTR): ρ is a non-constant function for all $\rho \in S_d$.

Monotonicity (MON): Let $\mathbf{x}, \mathbf{y} \in X^d$. If one has that $\mathbf{x} \leq \mathbf{y}$, then $\rho(\mathbf{x}) \leq \rho(\mathbf{y})$ for all $\rho \in S_d$.

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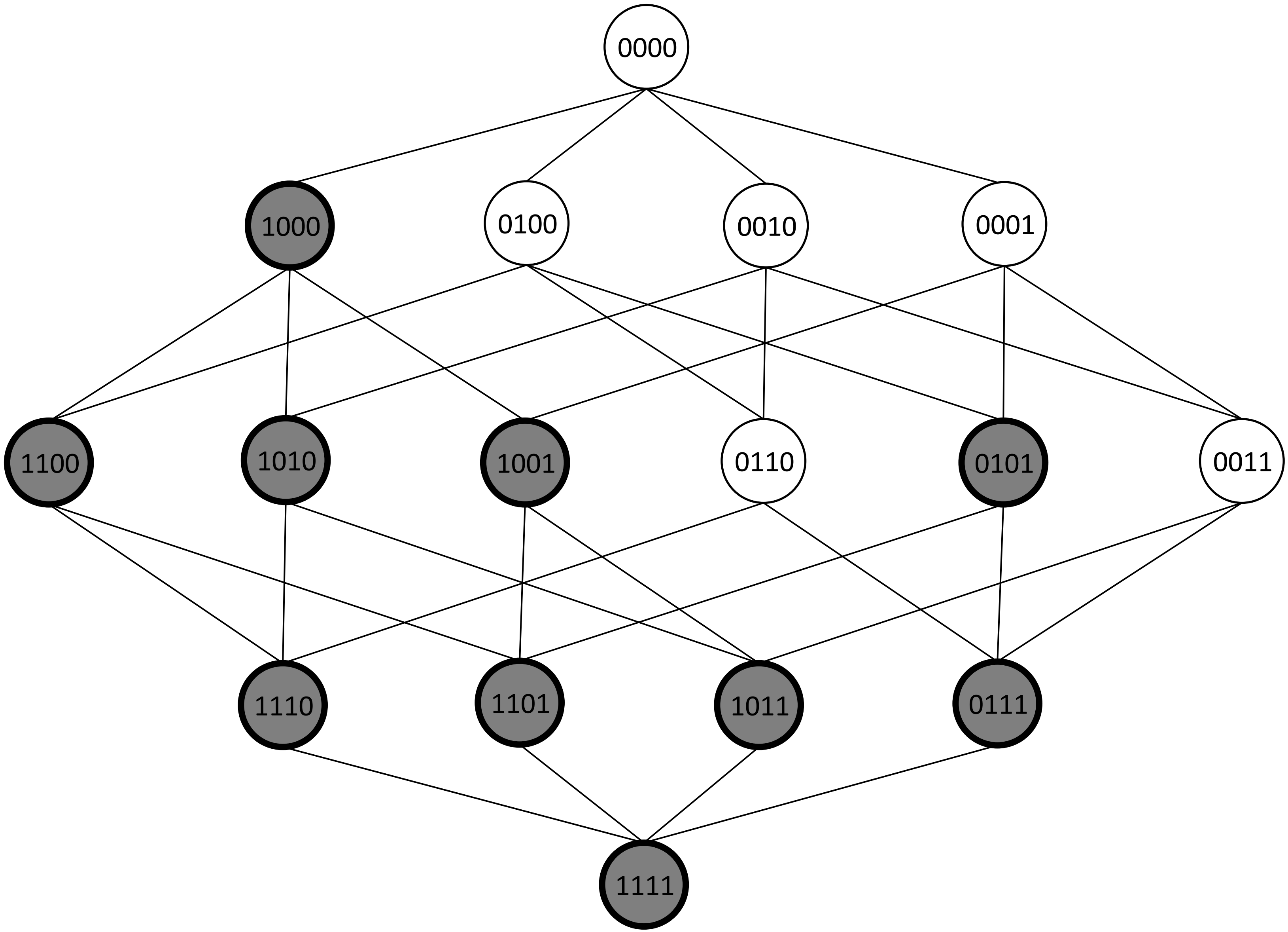
Proposition: $\rho \in \Omega_d$ satisfies NTR and MON $\Leftrightarrow (\mathcal{L}(P_\rho))^\uparrow = P_\rho$

Another identification function



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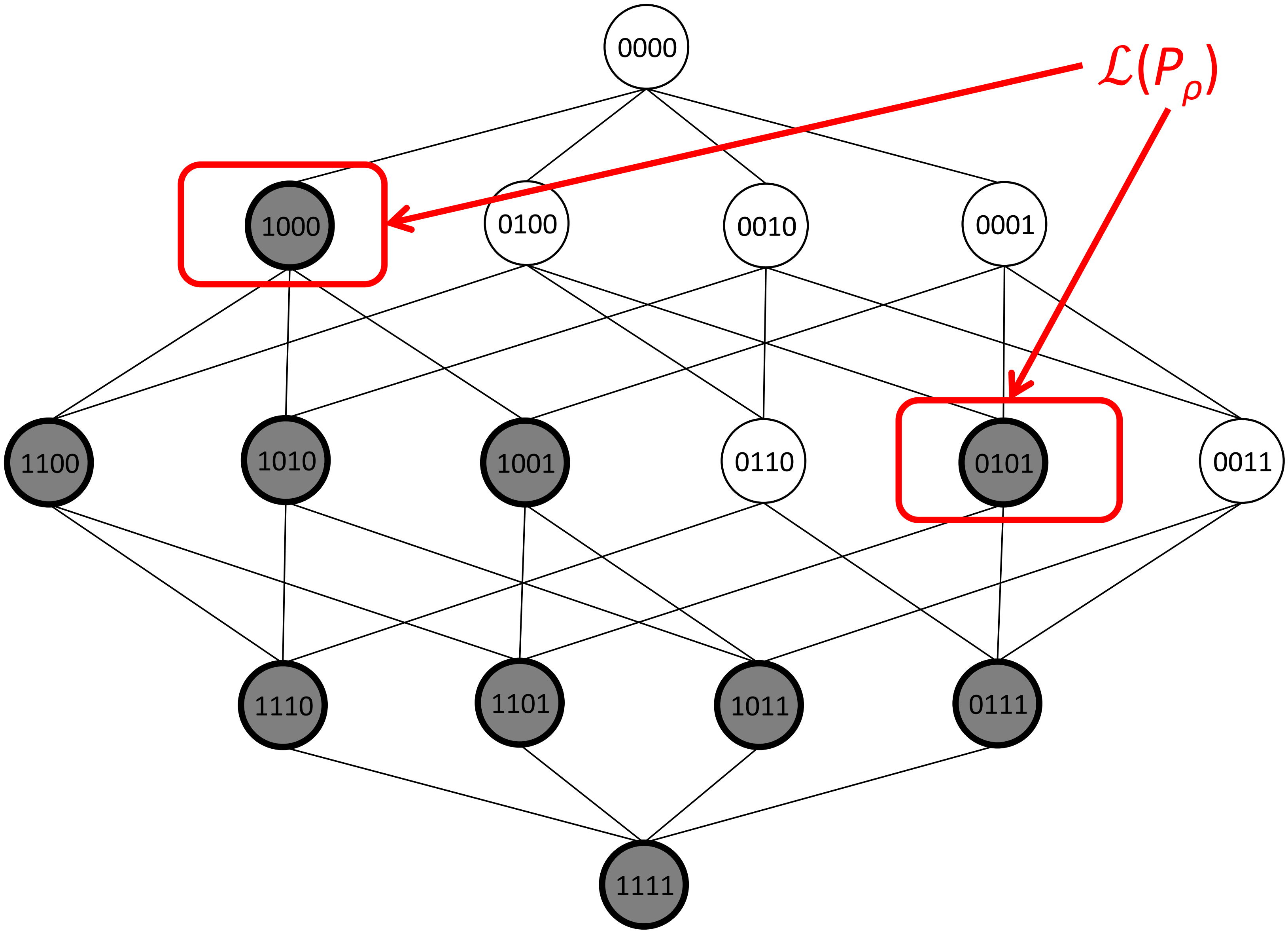
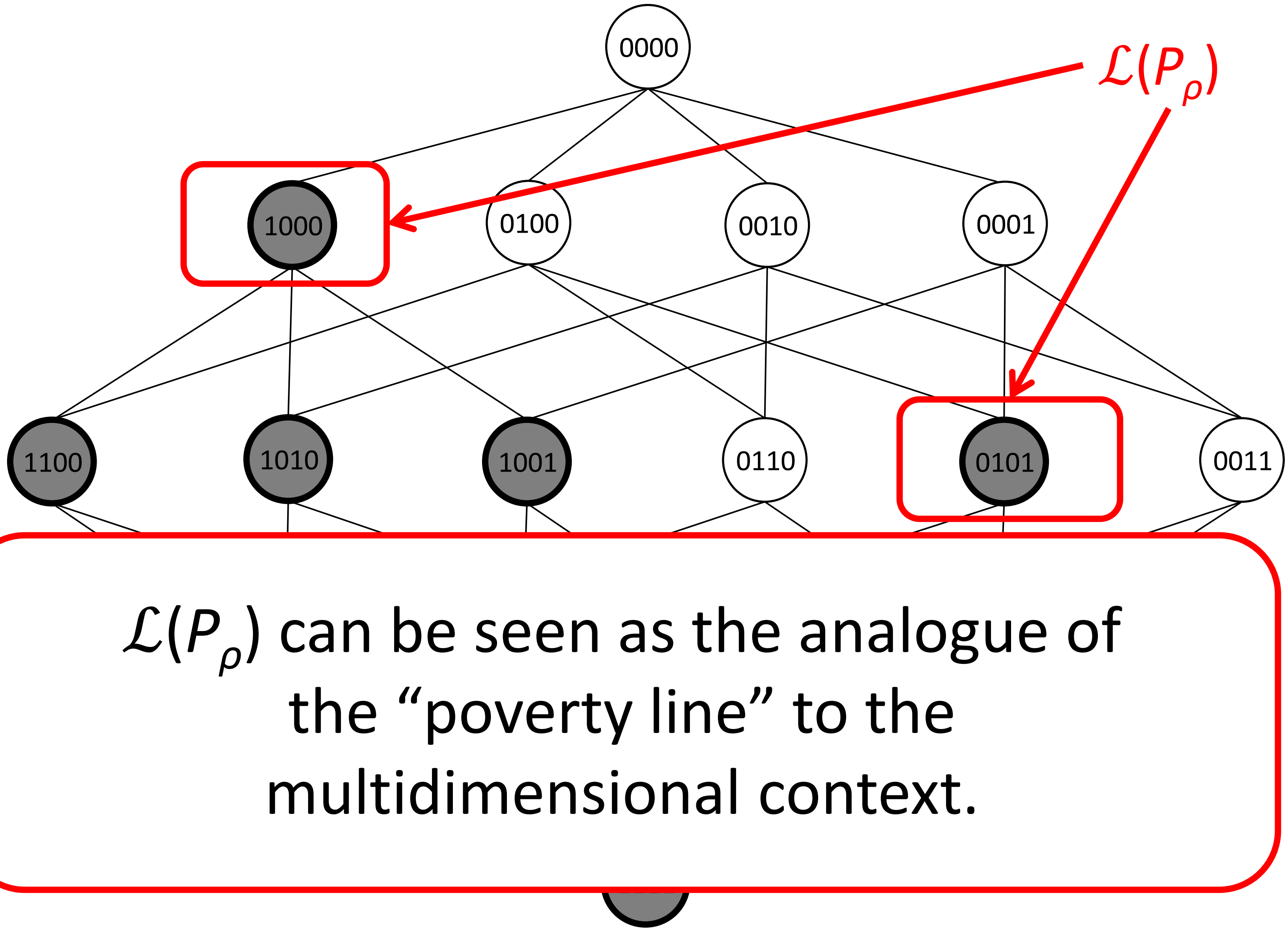


Another identification function



$\mathcal{L}(P_\rho)$ can be seen as the analogue of the "poverty line" to the multidimensional context.

Axiomatic characterization of ρ (2)

Anonymity (ANO): For any $i, j \in \{1, \ldots, d\}$ one has that $\rho(\mathbf{e}_i) = \rho(\mathbf{e}_j)$ for all $\rho \in S_d$.

Definition 1: Consider two hypothetical societies, each with $m > 1$ individuals, with deprivation profiles $(\mathbf{x}_1, \ldots, \mathbf{x}_m)$, $(\mathbf{y}_1, \ldots, \mathbf{y}_m)$. We say that these two societies are *equivalent* if for each dimension $j \in \{1, \ldots, d\}$ the number of individuals that are deprived in that dimension is the same in both societies, that is: $\sum_{i=1}^{i=m} x_{ij} = \sum_{i=1}^{i=m} y_{ij} \; \forall j \in \{1, \ldots, d\}$.

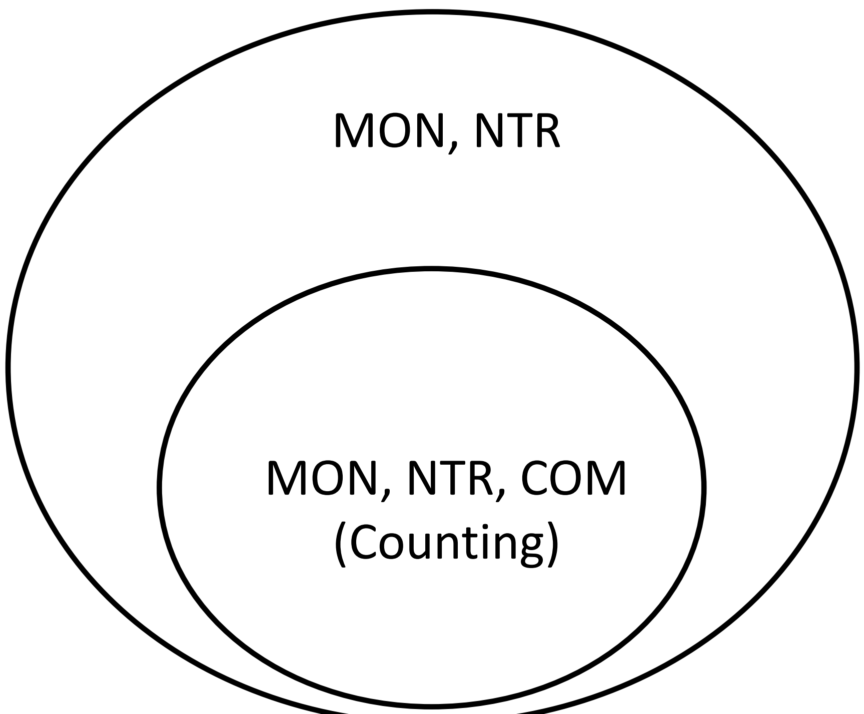
Compensation (COM): Consider two equivalent societies with deprivation profiles $(\mathbf{x}_1, \ldots, \mathbf{x}_m)$ and $(\mathbf{y}_1, \ldots, \mathbf{y}_m)$. Assume that $\rho(\mathbf{x}_1) \geq \rho(\mathbf{y}_1), \ldots, \rho(\mathbf{x}_{m-1}) \geq \rho(\mathbf{y}_{m-1})$ for all $\rho \in S_d$. Then, one must have that $\rho(\mathbf{x}_m) \leq \rho(\mathbf{y}_m)$ for all $\rho \in S_d$.

Axiomatic characterization of ρ (3)

- **Theorem 1**: Let $S_d \subseteq \Omega_d$. One has that the different $\rho \in S_d$ satisfy MON, COM and NTR if and only if S_d is the set of **weighted counting identification functions**. In addition, if one further imposes ANO, then S_d is the set of **unweighted counting identification functions**.

Main Result

- When $d \geq 4$, the set of identification functions generated by the counting approach is strictly included within the set of 'Consistent-identification functions'.



What’s out there?

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Counting and multidimensional poverty measurement

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ABSTRACT

This paper proposes a new methodology for multidimensional poverty measurement consisting of an identification method ρ_k that extends the traditional intersection and union approaches, and a class of poverty measures M_α. Our identification step employs two forms of cutoff: one within each dimension to determine whether a person is deprived in that dimension, and a second across dimensions that identifies the poor by 'counting' the dimensions in which a person is deprived. The aggregation step employs the FGT measures, appropriately adjusted to account for multidimensionality. The axioms are presented as joint restrictions on identification and the measures, and the methodology satisfies a range of desirable properties including decomposability. The identification method is particularly well suited for use with ordinal data, as is the first of our measures, the adjusted headcount ratio M_0. We present some dominance results and an interpretation of the adjusted headcount ratio as a measure of unfreedom. Examples from the US and Indonesia illustrate our methodology.

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9. Illustrative examples

We now illustrate the measurement methodology and its variations using data from the United States and Indonesia.

9.1. United States

To estimate multidimensional poverty in the US we use data from the 2004 National Health Interview Survey[35] on adults aged 19 and above ($n=45{,}884$). We draw on four variables: (1) income measured in poverty line increments and grouped into 15 categories, (2) self-reported health, (3) health insurance, and (4) years of schooling. For this

Counting

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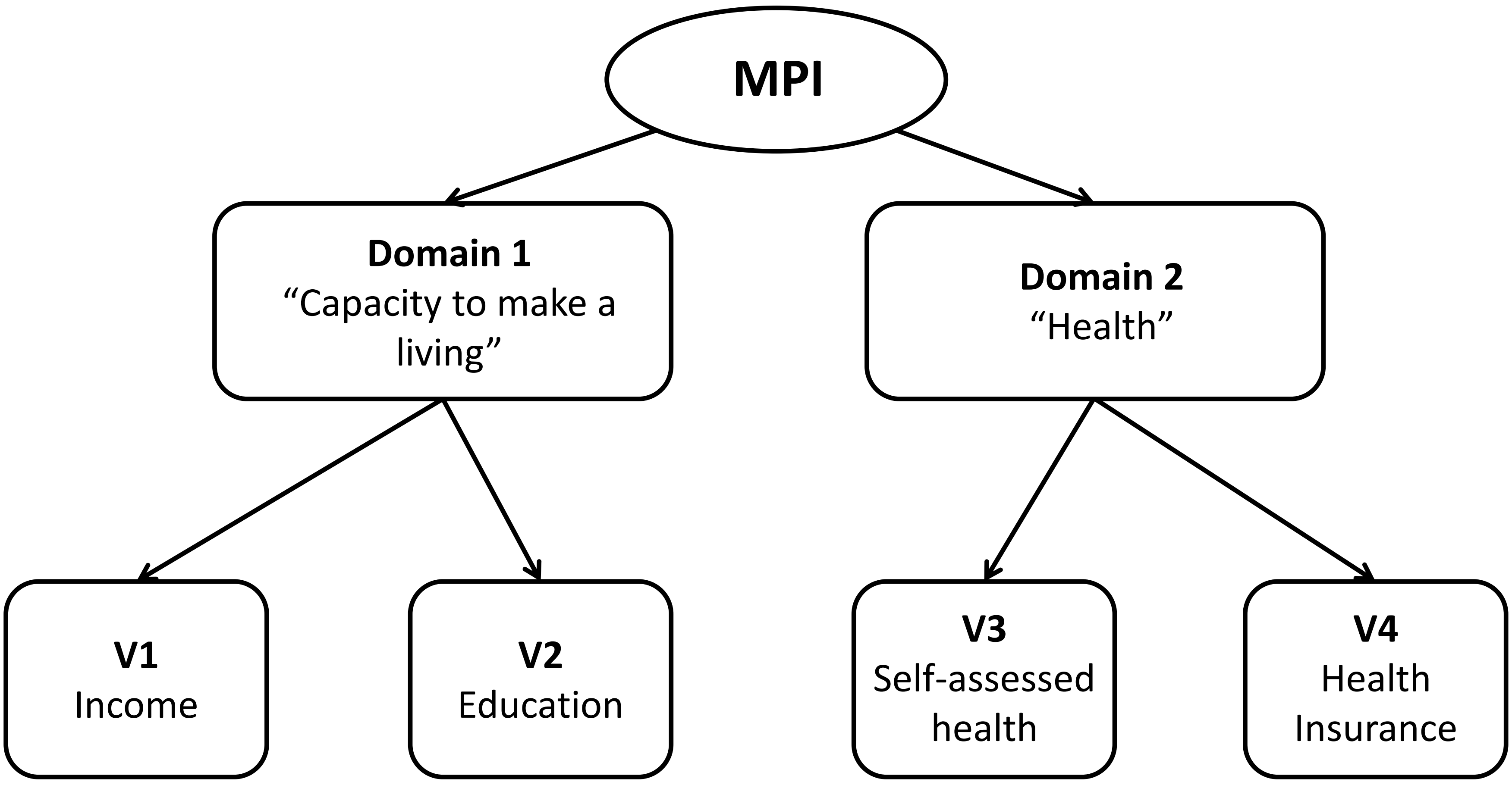
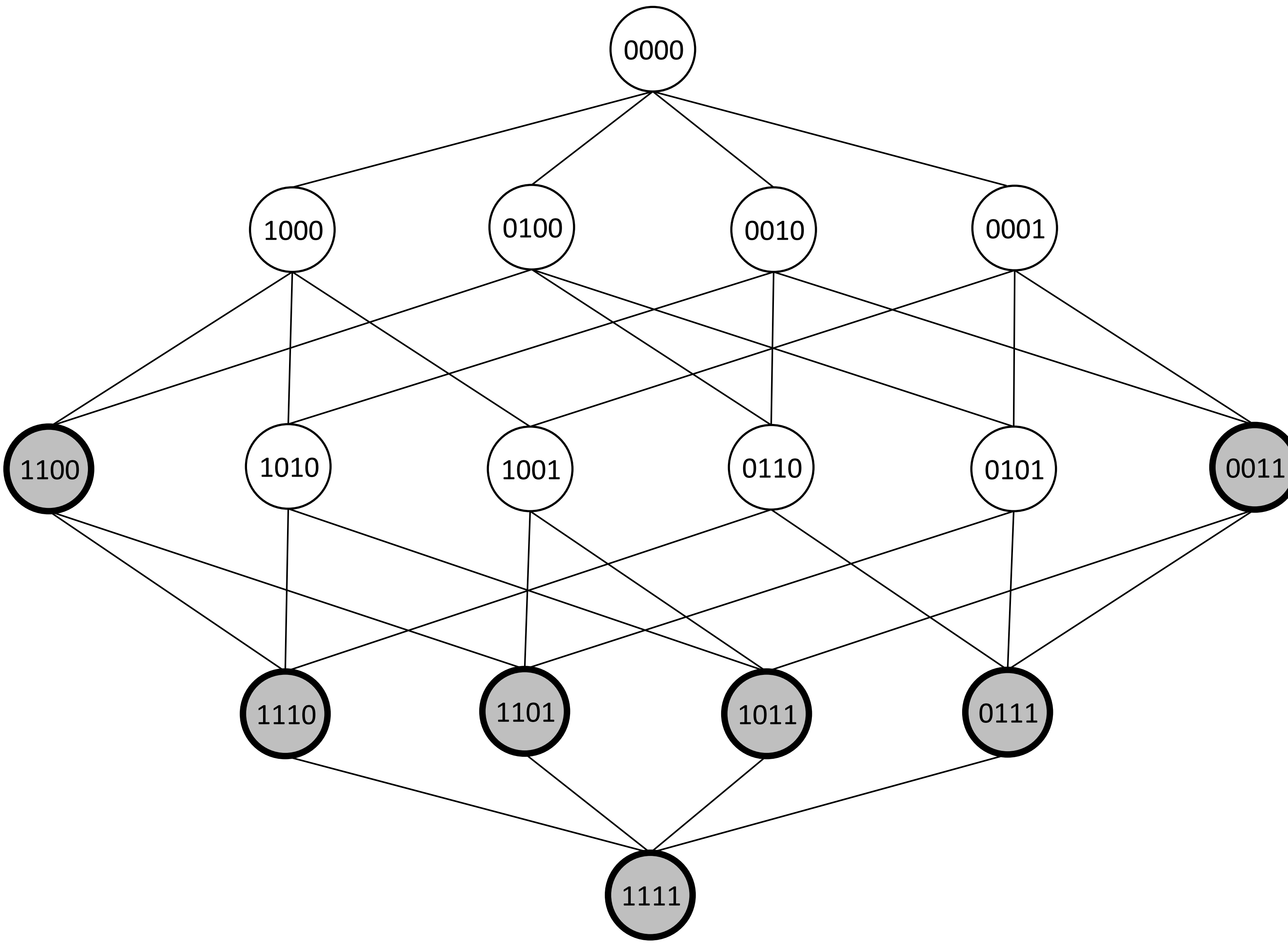
An illustrative example

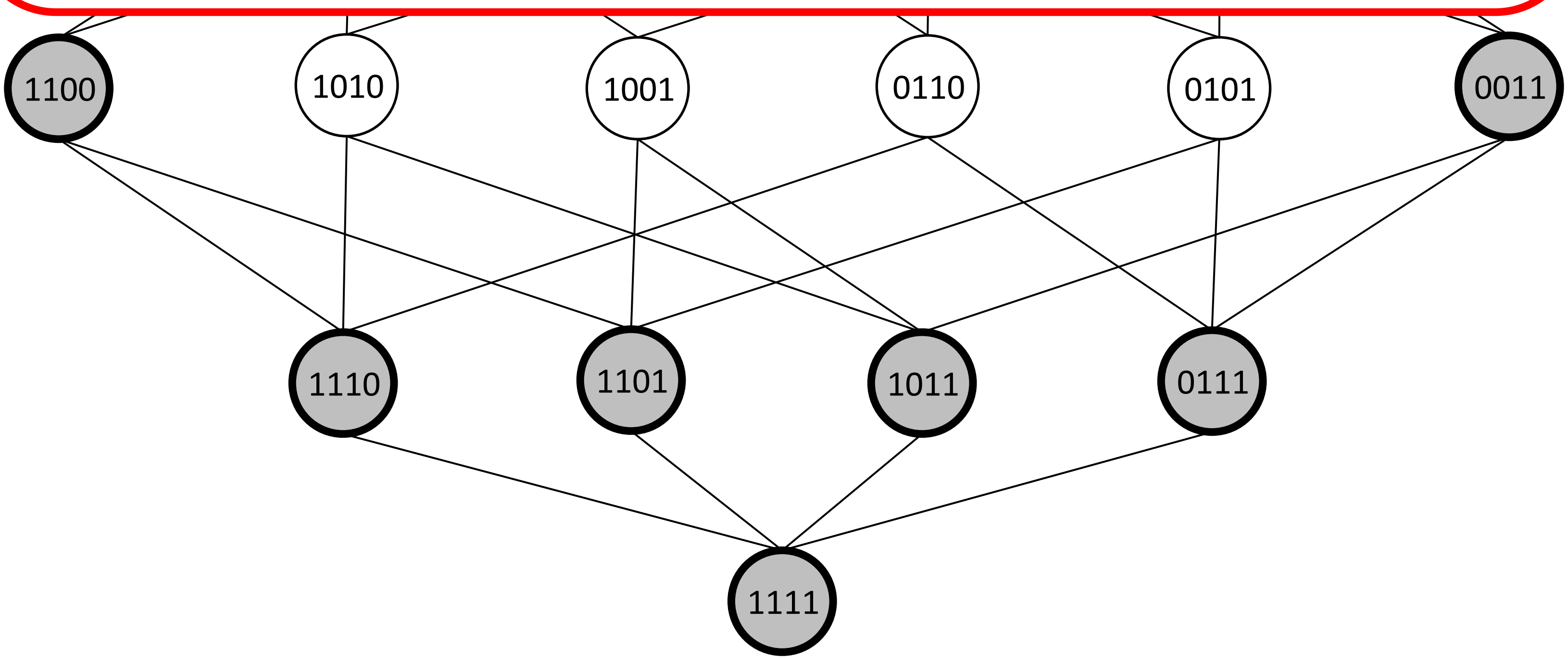


A new 'set of poor profiles' (I)



A new ‘set of poor profiles’ (I)

There exists no weighting scheme (w_1, w_2, w_3, w_4) and no poverty threshold k generating this set of poor profiles via the counting approach



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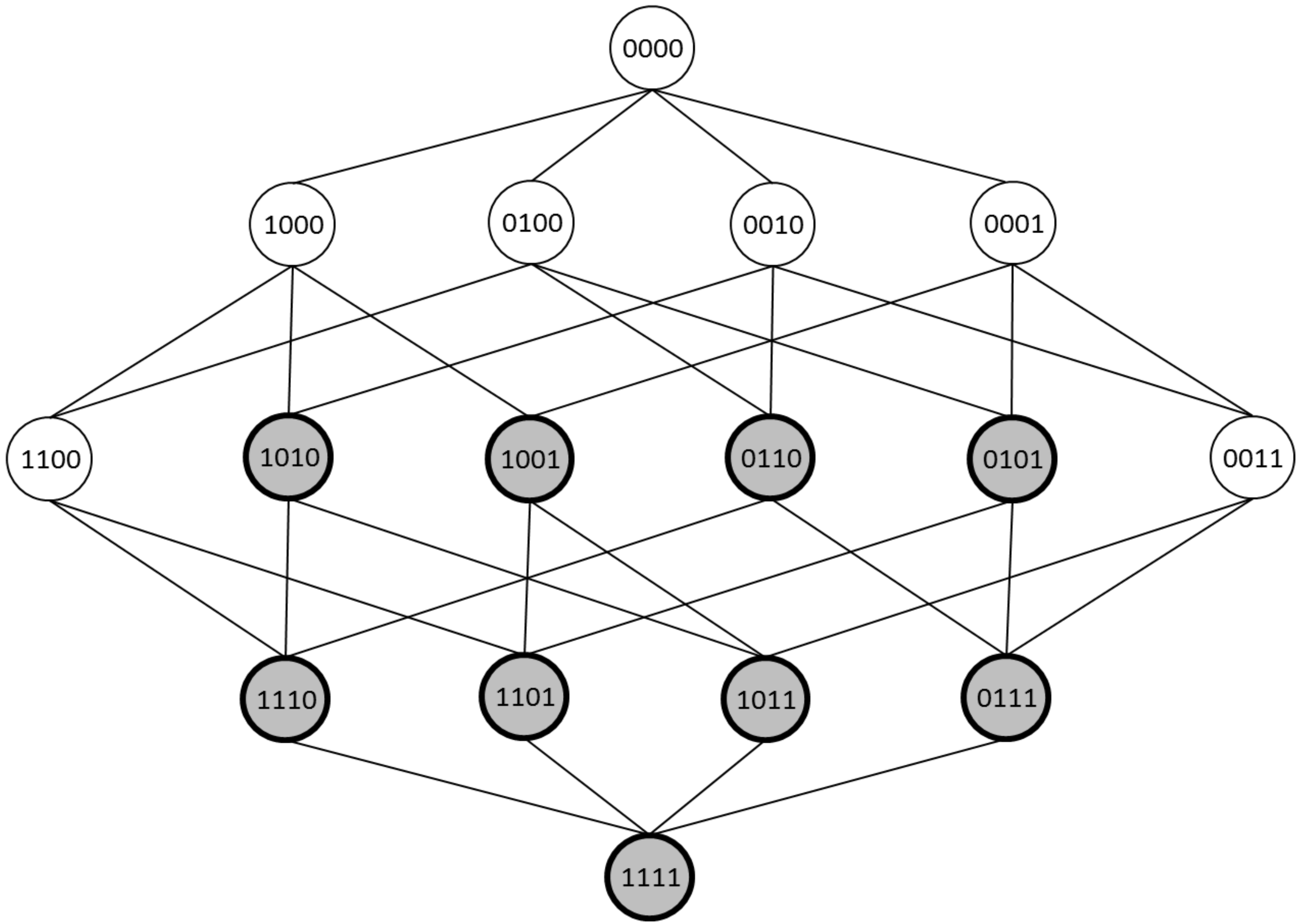

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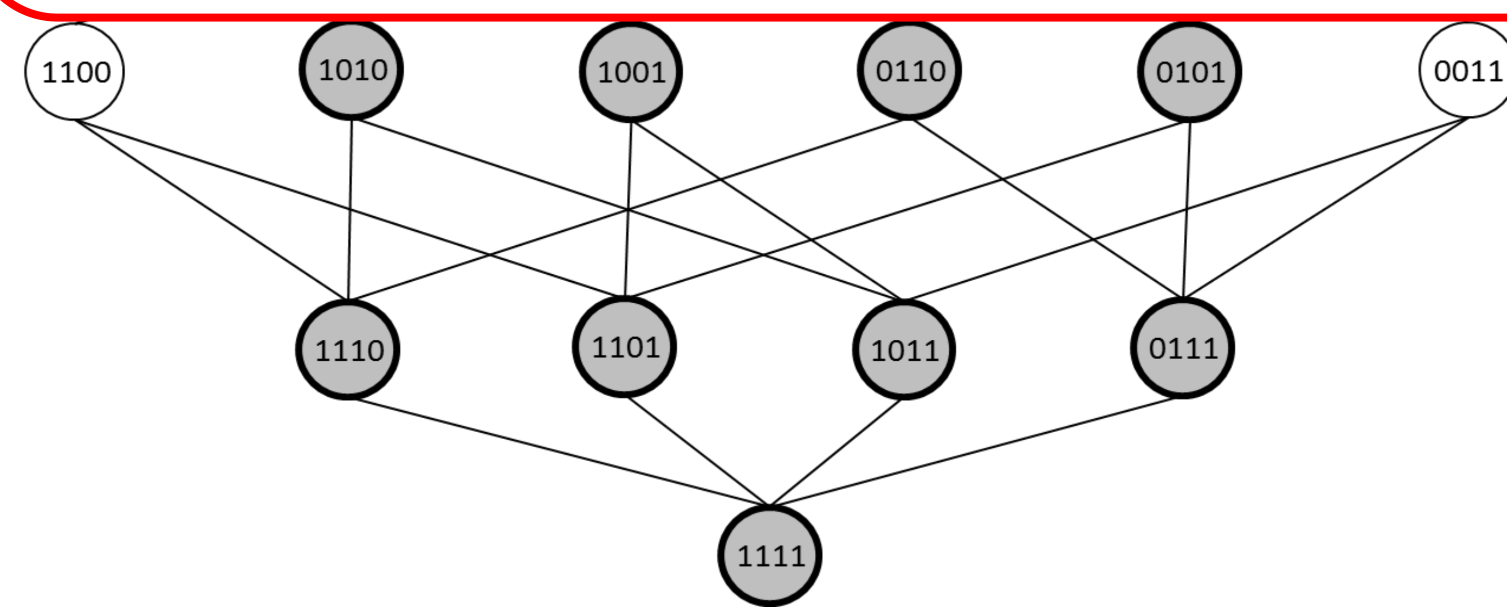


Aggregation

Aggregation: the AF approach

- Let g_{ij} be the poverty gap for individual *i* in attribute *j*.
- Generalization of the FGT index to the multidimensional context.

$$M_\alpha = \mu(g^\alpha(k))$$

  - M_0 (adjusted headcount ratio)
  - M_1 (adjusted poverty gap)
  - M_2 (adjusted FGT measure)
- Flexible identification methods.
- Can be used with ordinal data (M_0).

Aggregation

Paper	Notation	Formula	Range	MD Poverty Index
Tsui (2002)	g_{ij}^{T1}	$z_j / Min\{x_{ij}, z_j\}$	$R_{T1} = [1, +\infty)$	$\frac{1}{n} \sum_{i=1}^{n} \left[\prod_{j=1}^{k} \left(g_{ij}^{T1} \right)^{\alpha_j} - 1 \right]$
Tsui (2002)	g_{ij}^{T2}	$\ln(z_j / Min\{x_{ij}, z_j\})$	$R_{T2} = [0, +\infty)$	$\frac{1}{n} \sum_{i=1}^{n} \sum_{j=1}^{k} \delta_j g_{ij}^{T2}$
Tsui (2002)	g_{ij}^{T3}	$z_j - Min\{x_{ij}, z_j\}$	$R_{T3} = [0, +\infty)$	$\frac{1}{n} \sum_{i=1}^{n} \left(\prod_{j=1}^{k} e^{r_j g_{ij}^{T3}} - 1 \right)$
Tsui (2002)	g_{ij}^{T4}	$z_j - Min\{x_{ij}, z_j\}$	$R_{T4} = [0, +\infty)$	$\frac{1}{n} \sum_{i=1}^{n} \sum_{j=1}^{k} c_j g_{ij}^{T4}$
B&C (2003)	g_{ij}^{BC}	$Max \left\{ \frac{z_j - x_{ij}}{z_j}, 0 \right\}$	$R_{BC} = [0, 1]$	$\frac{1}{n} \sum_{i=1}^{n} F \left(\left[\sum_{j=1}^{k} w_j \left(g_{ij}^{BC} \right)^{\theta} \right]^{1/\theta} \right)$
C&D&S (2008)	g_{ij}^{W}	$\ln(z_j / Min\{x_{ij}, z_j\})$	$R_{W} = [0, +\infty)$	$\frac{1}{n} \sum_{i=1}^{n} \sum_{j=1}^{k} g_{ij}^{W}$
A&F (2011)	g_{ij}^{AF}	$Max \left\{ \frac{z_j - x_{ij}}{z_j}, 0 \right\}$	$R_{AF} = [0, 1]$	$\frac{1}{nk} \sum_{i \in P} \sum_{j=1}^{k} \left(g_{ij}^{AF} \right)^{\alpha}$

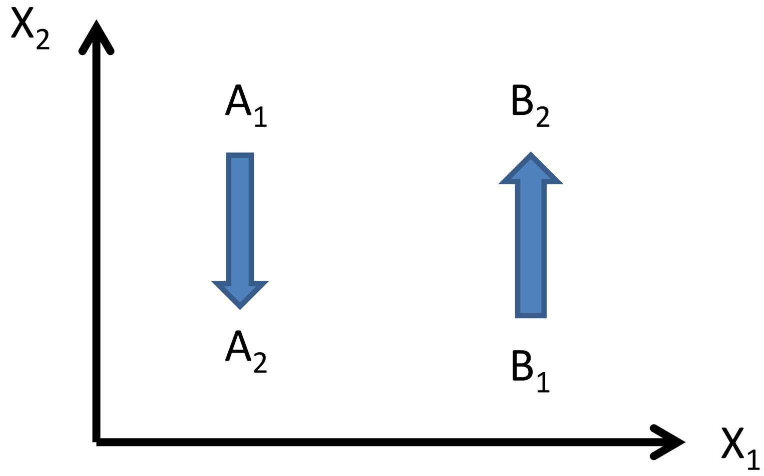
Aggregation

Paper	Notation	Formula	Range	MD Poverty Index
Tsui (2002)	g_{ij}^{T1}	$z_j/Min\{x_{ij}, z_j\}$	$R_{T1} = [1, +\infty)$	$\frac{1}{n}\sum_{i=1}^{n}\left[\prod_{j=1}^{k}(g_{ij}^{T1})^{\alpha_j} - 1\right]$
Tsui (2002)	g_{ij}^{T2}	[illegible]	[illegible]	[illegible]
Tsu[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tsu[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B&C [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C&D&S (2008)	g_{ij}^{W}	$\ln(z_j/Min\{x_{ij}, z_j\})$	$R_W = [0, +\infty)$	$\frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{k} g_{ij}^{W}$
A&F (2011)	g_{ij}^{AF}	$Max\left\{\frac{z_j - x_{ij}}{z_j}, 0\right\}$	$R_{AF} = [0, 1]$	$\frac{1}{nk}\sum_{i\in P}\sum_{j=1}^{k}(g_{ij}^{AF})^{\alpha}$

All pairs of attributes are either complements or substitutes

Association between variables

- Should poverty increase or decrease under a correlation increasing switch?



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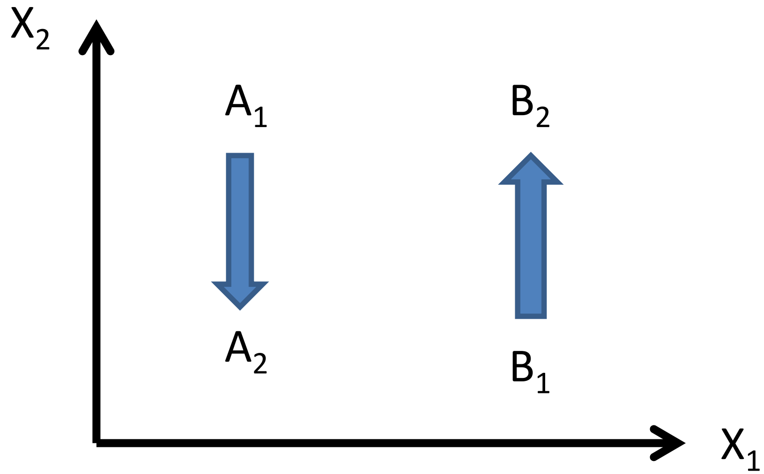


- It depends on whether they are complements or substitutes. Yet, with current approaches **all pairs** of attributes are either complements or substitutes!

Focus axioms

- **Strong focus**: Poverty levels are unaffected by increases in *any* non-deprived attribute.
- **Weak focus**: Poverty levels are unaffected by increases in any attribute among the non-poor.

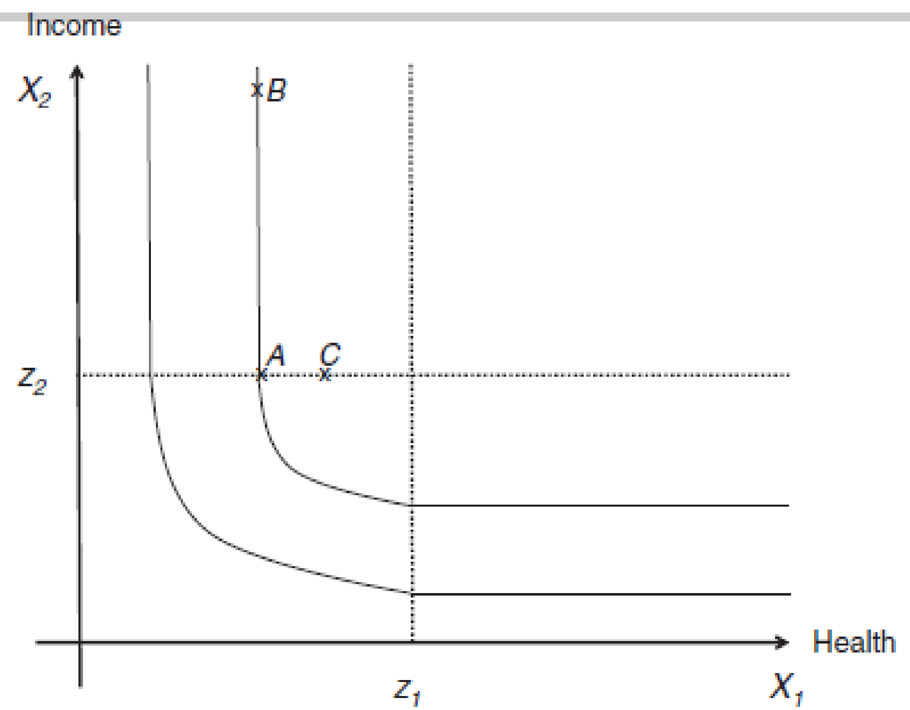


Fig. 1. Iso-poverty contours under the Strong Focus axiom for the case $k = 2$ (adapted from Fig. 3 in Bourguignon and Chakravarty, 2003).

Strong Focus:
P(A)=P(B)

Weak Focus:
P(B)<P(A)
P(B)=P(C)

- Currently, virtually all multidimensional poverty measures satisfy the (overly restrictive) Strong Focus axiom.
- An exception (Permanyer 2014)

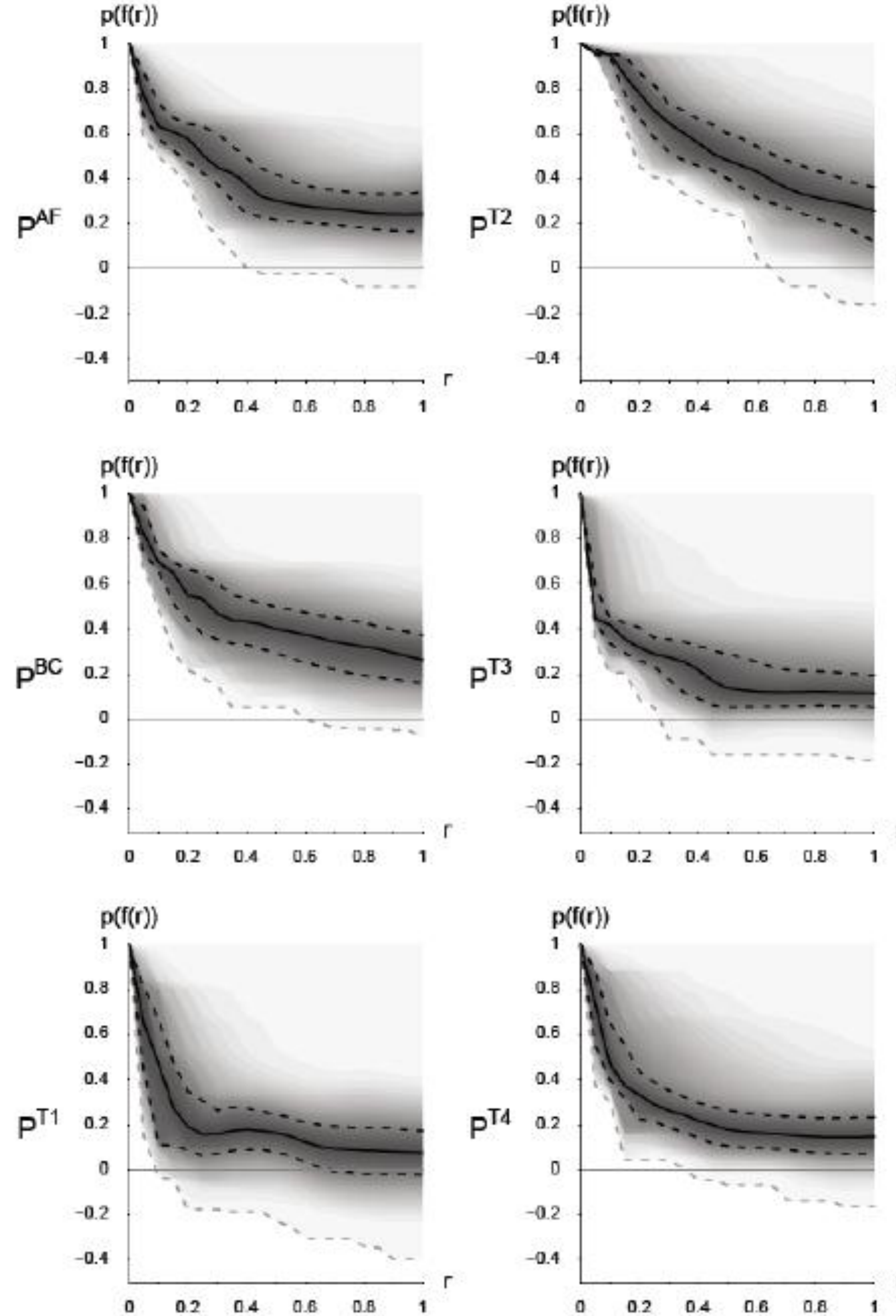
Theorem 1. *If a multidimensional poverty index P satisfies Subgroup Decomposability, Continuity, Homotheticity, Weak Dimension Separability, Monotonicity on Deprivation Gaps and Independence, then it can be written as*

$$P(G,E) = \frac{1}{n}\sum_{i=1}^{n}\psi\left(\left[\sum_{j=1}^{k}\left(g_{ij}\prod_{l=1}^{k}\varphi_{jl}(e_{il})\right)^{\theta}\right]^{1/\theta}\right) \quad (5)$$

where ψ is a continuous increasing function, $\varphi_{jl}(.)$ are continuous functions and $\theta > 0$.

- This allows non-trivial compensations between deprived and non-deprived attributes.

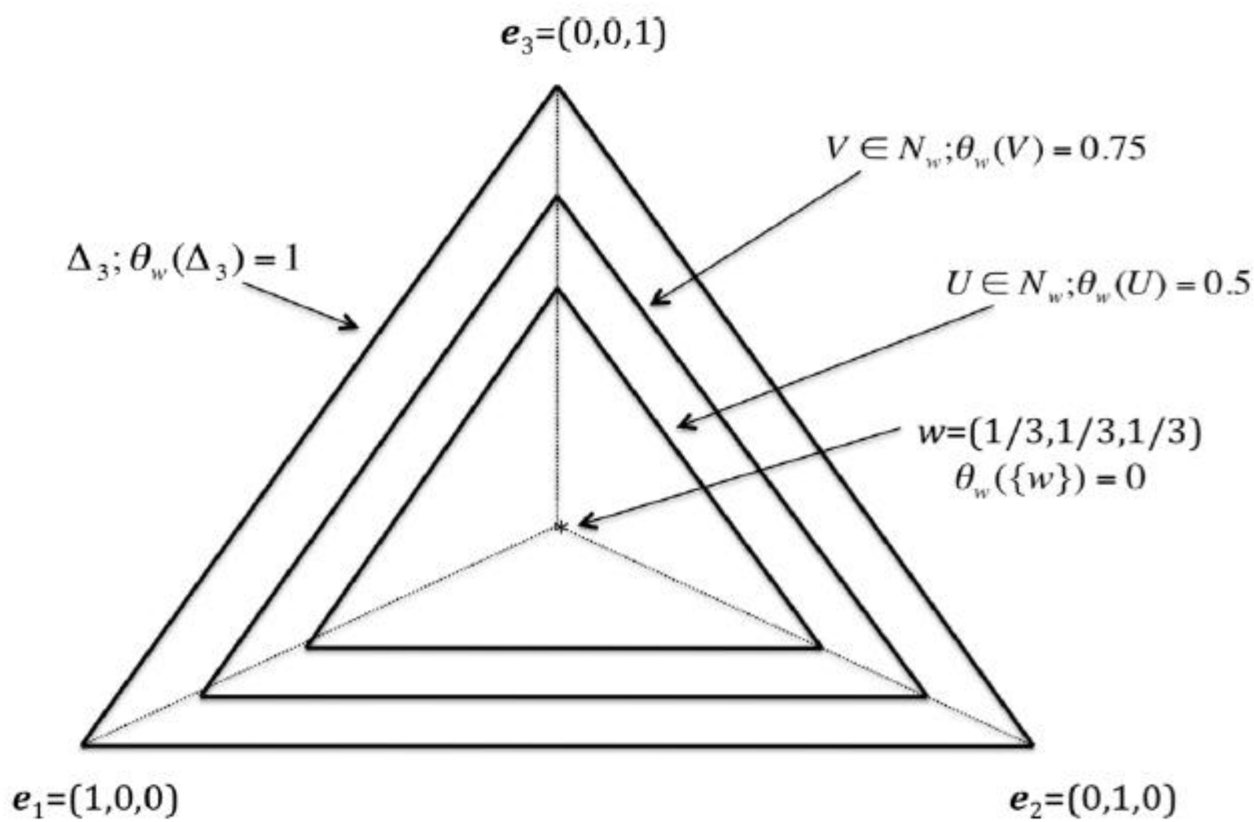
Does it make a difference?



Weighting dimensions

- Weights determine contribution of attributes to well-being and their degree of substitution.
- **Equal weighting**: lack of information about "consensus" view.
- **Users' own choice**.
- **Market prices**: non-existing or distorted by market imperfections and externalities, inappropriate for well-being comparisons.
- **Consultations**, with experts or public, or **survey responses.**
- **Data-based weighting**: Frequency-based approaches (weight inversely proportional to share of deprived people) or multivariate statistical techniques.

- Different weighting structures reflect different views: normative exercise.
- In case of uncertainty, use a range of weights. Example for k=3 dimensions.



Decomposability

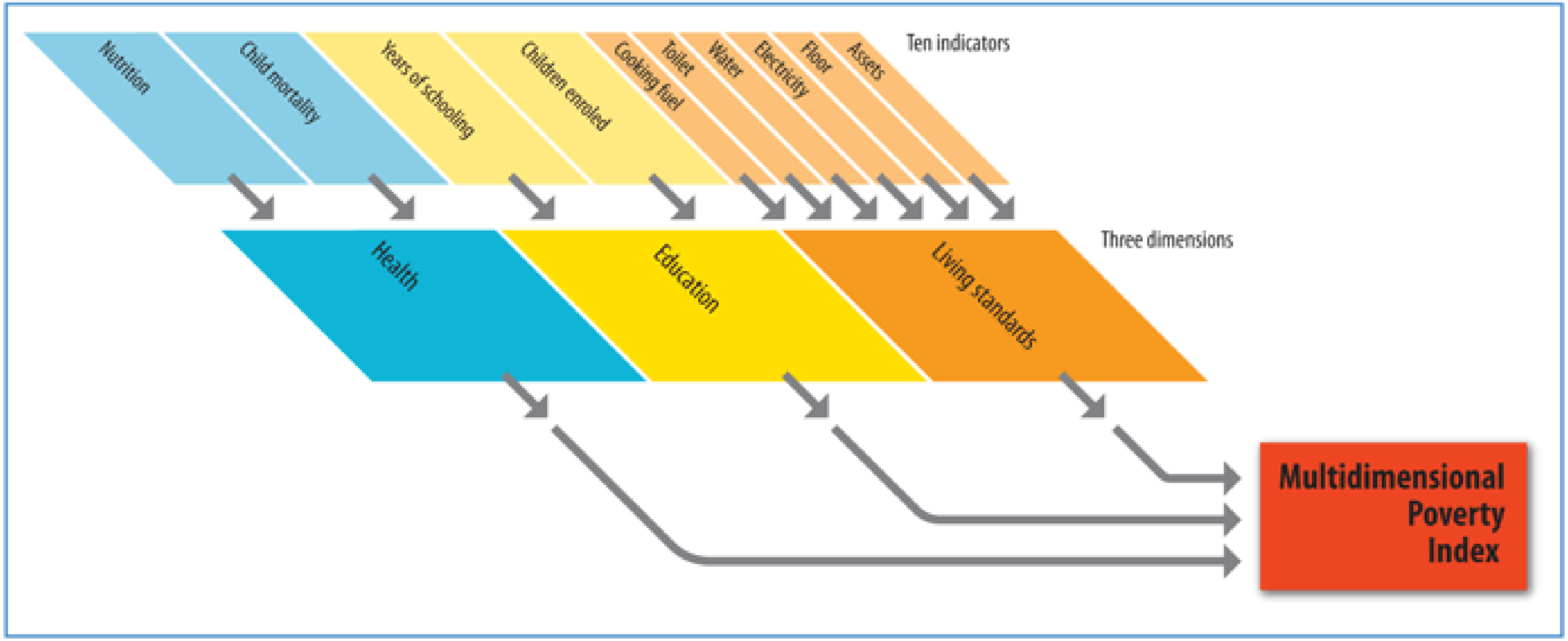
- Useful to know the contribution of each dimension to overall poverty.
- Limits the criticism against composite index approaches.
- Decomposability is at odds with non-trivial dependency structures.

Empirical evidence

Human Development Report 2010

FIGURE 5.7 **Components of the Multidimensional Poverty Index**

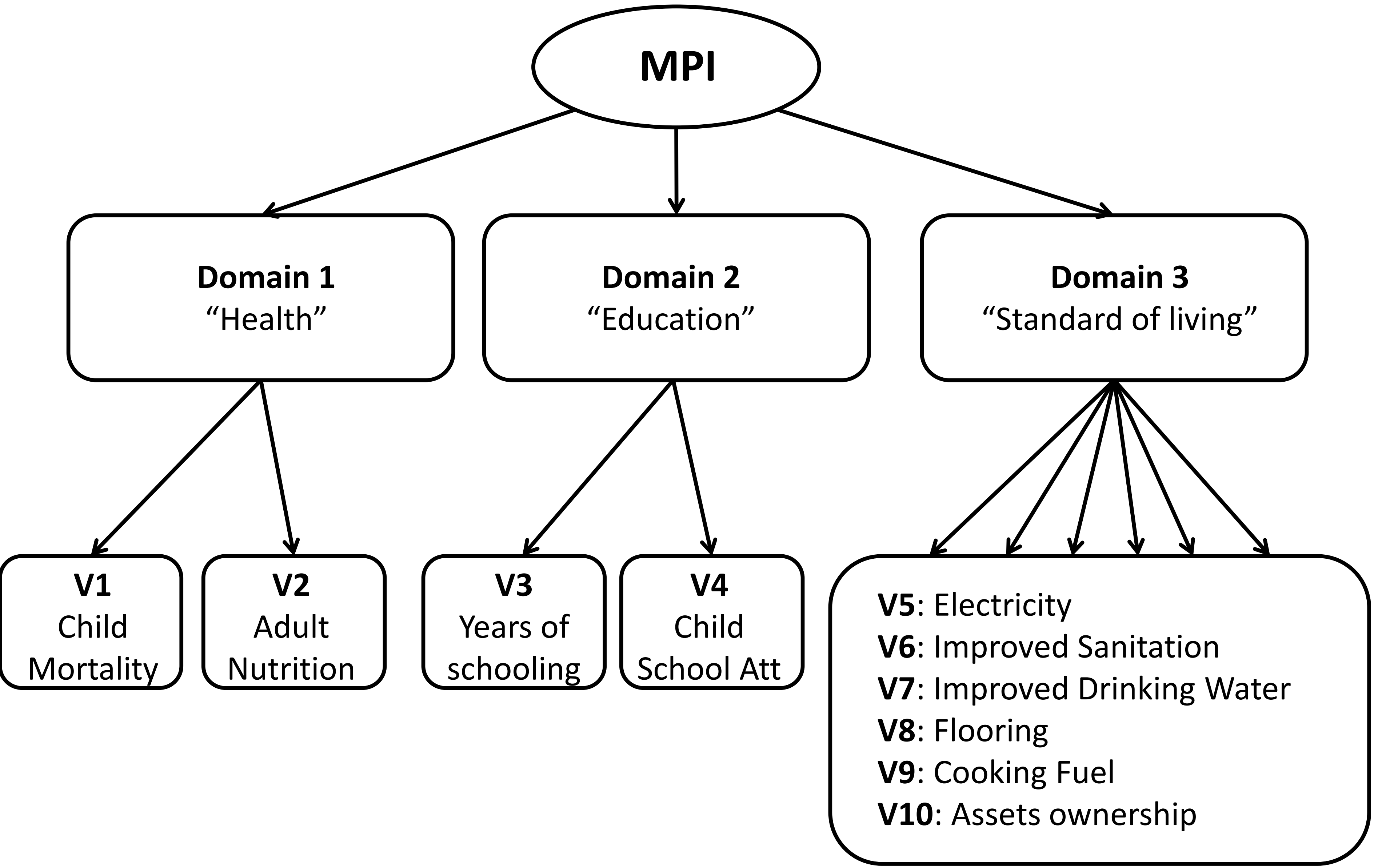
MPI—three dimensions and 10 indicators



Note: The size of the boxes reflects the relative weights of the indicators.

Source: Alkire and Santos 2010.

Empirical Example: UNDP's MPI



Dimensions and deprivations

Dimensions of poverty	Indicator	Deprived if…	Weight
Education	Years of Schooling	No household member has completed five years of schooling.	1/6
	Child School Attendance	Any school aged child is not attending school up to class 8.	1/6
Health	Child Mortality	Any child has died in the family.	1/6
	Nutrition	Any adult for whom there is nutritional information is malnourished.	1/6
Living Standard	Electricity	The household has no electricity.	1/18
	Improved Sanitation	The household's sanitation facility is not improved (according to MDG guidelines), or it is improved but shared with other households.	1/18
	Improved Drinking Water	The household does not have access to improved drinking water (according to MDG guidelines) or safe drinking water is more than a 30-minute walk from home, roundtrip.	1/18
	Flooring	The household has a dirt, sand or dung floor.	1/18
	Cooking Fuel	The household cooks with dung, wood or charcoal.	1/18
	Assets ownership	The household does not own more than one radio, TV, telephone, bike, motorbike or refrigerator and does not own a car or truck.	1/18

Results (I)

Table 3: Summary MPI and income poverty estimates by UN regions

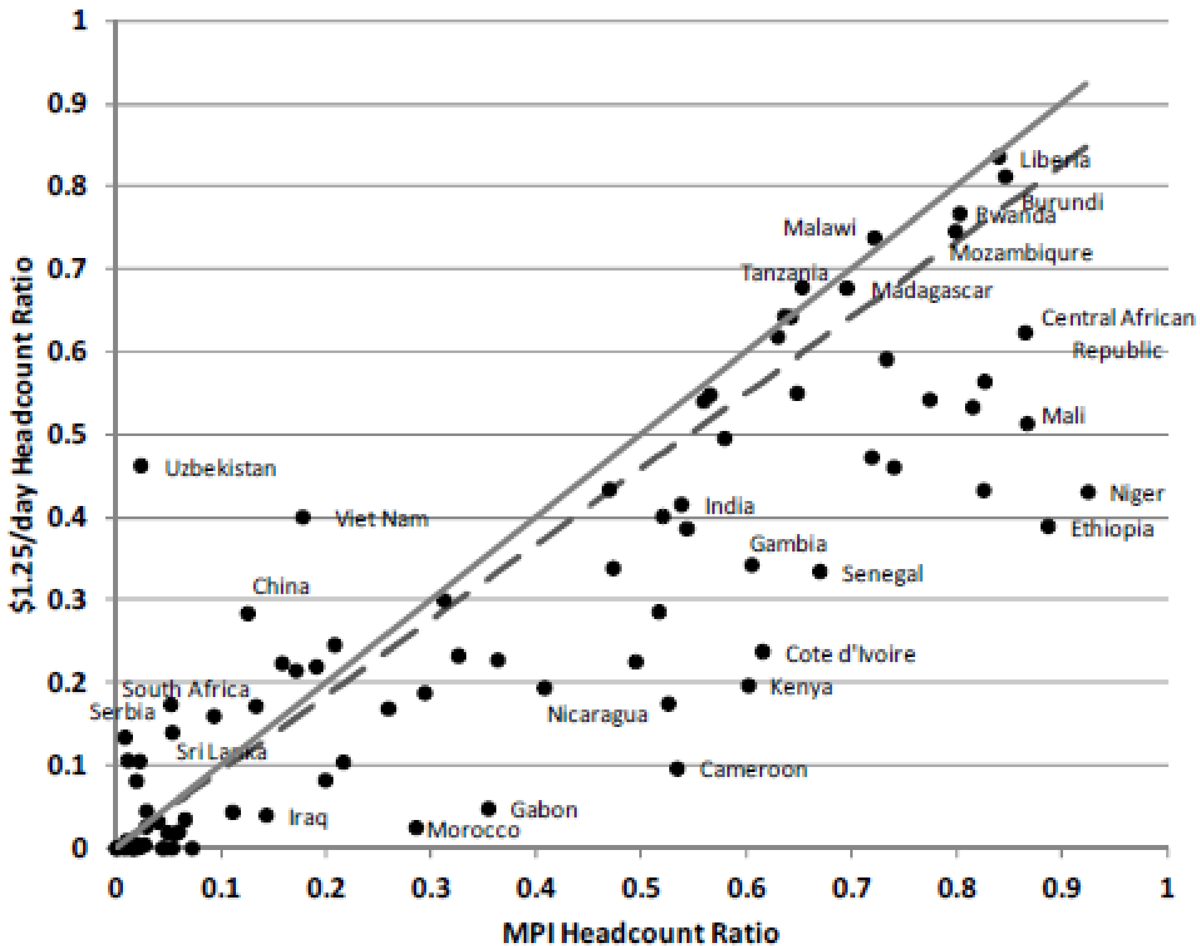
Region of the World	Total Pop. (millions)	H	A	MPI	MPI poor pop. (millions)	$1.25/day poor	$1.25/day poor pop. (millions)	$2/day poor	$2/day poor pop. (millions)
CEE and CIS	398.3	0.029	0.394	0.011	11.4	0.045	18.0	0.110	43.8
LAC	491.8	0.154	0.419	0.064	75.6	0.101	49.8	0.200	98.2
EAP	1864.5	0.146	0.457	0.066	271.4	0.265	494.4	0.498	927.7
AS	212.7	0.179	0.508	0.091	38.0	0.038	8.1	0.194	41.2
SA	1531.0	0.532	0.526	0.280	814.9	0.402	615.4	0.741	1133.8
SSA	703.7	0.647	0.577	0.374	455.5	0.486	342.3	0.705	496.2
Total 104 countries	**5202.1**	**0.320**	**0.522**	**0.167**	**1666.8**	**0.294**	**1528.0**	**0.527**	**2741.0**

Note: Pop. is Population, expressed in millions. H, A, MPI, $1.25/day poor and $2/day poor are all proportions.

CEE and CIS: Central and Eastern Europe and the Commonwealth of Independent States. LAC: Latin America and the Caribbean. EAP: East Asia and the Pacific. AS: Arab States. SA: South Asia. SSA: Sub-Saharan Africa.

Results (II)

Figure 3: MPI poor headcount ratio vs. $1.25/day poor headcount ratio



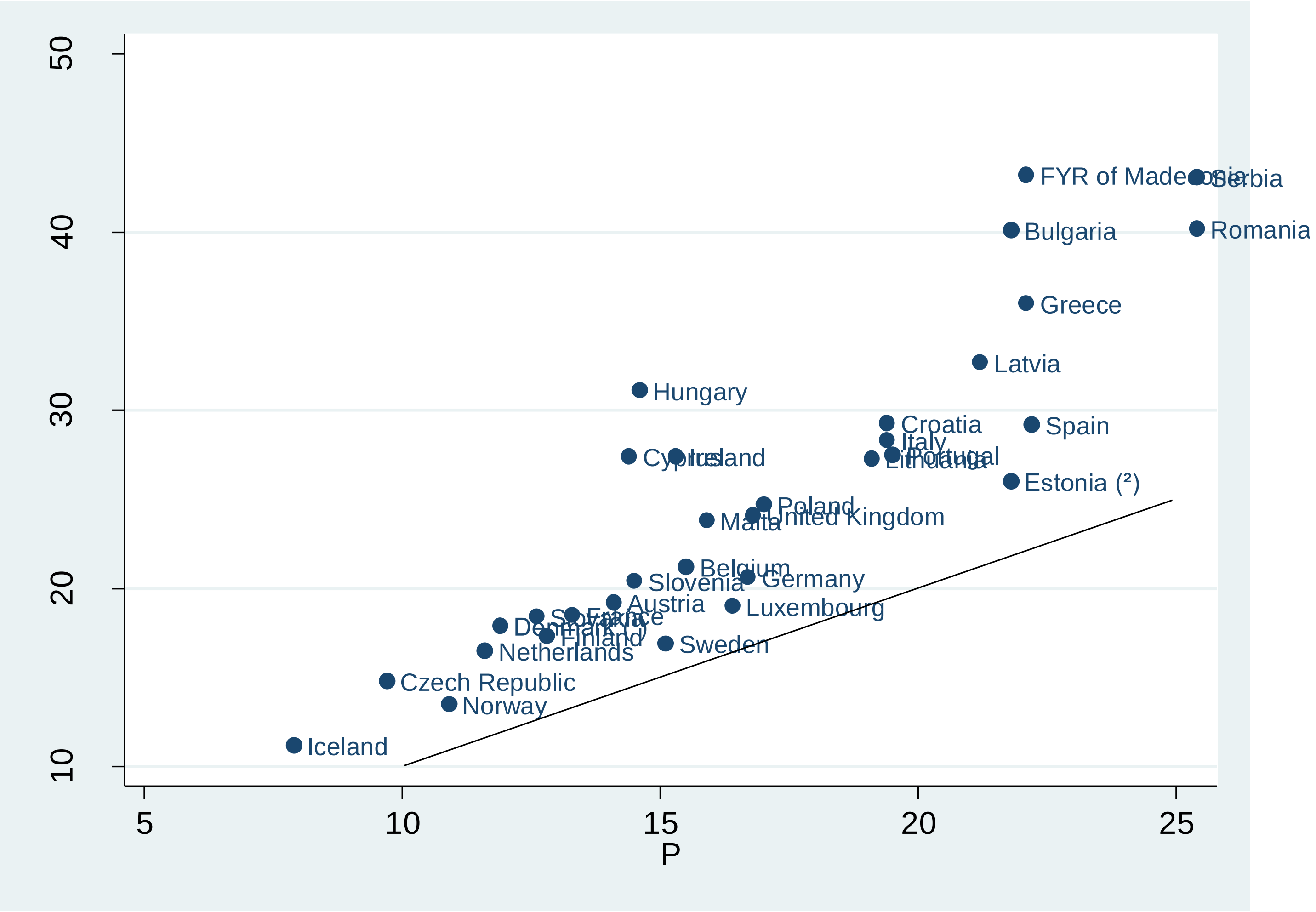
AROPE (1)

- Composite index of ‘risk-of-poverty-and-social-exclusion’ in European countries.
- Three components
  - Income poverty (below 60% Median)
  - Low work intensity (work less than 20% of total potential)
  - Material deprivation (not able to afford 4 out of 9 basic items).
- Union approach

Table 2: AROPE, 2007-2011 and At-risk-of-poverty threshold, 2011

	People at risk of poverty or social exclusion					At-risk-of-poverty threshold	
Member States	2007	2008	2009	2010	2011	EUR - 2011	
						Single person	2 adults with 2 children <14
EU28	:	:	:	23.7	24.3		
EU27	24.4	23.7	23.2	23.7	24.3		
BE	21.6	20.8	20.2	20.8	21.0	12 005	25 210
BG	60.7	44.8	46.2	49.2	49.1	1 749	3 672
CZ	15.8	15.3	14.0	14.4	15.3	4 471	9 389
DK	16.8	16.3	17.6	18.3	18.9	15 837	33 257
DE	20.6	20.1	20.0	19.7	19.9	11 426	23 994
EE	22.0	21.8	23.4	21.7	23.1	3 359	7 053
IE	23.1	23.7	25.7	27.3	29.4	11 836	24 855
EL	28.3	28.1	27.6	27.7	31.0	6 591	13 841
ES	23.3	24.5	24.5	26.7	27.7	7 272	15 271
FR	19.0	18.6	18.5	19.2	19.3	11 997	25 194
HR	:	:	:	30.7	32.3	3 356	7 047
IT	26.0	25.3	24.7	24.5	28.2	9 583	20 125
CY	25.2	23.3	23.5	24.6	24.6	10 194	21 408
LV	36.0	33.8	37.4	38.1	40.4	2 490	5 229
LT	28.7	27.6	29.5	33.4	33.1	2 314	4 860
LU	15.9	15.5	17.8	17.1	16.8	19 523	40 998
HU	29.4	28.2	29.6	29.9	31.0	2 721	5 714
MT	19.4	19.6	20.2	20.3	21.4	6 517	13 686
NL	15.7	14.9	15.1	15.1	15.7	12 186	25 590
AT	16.7	18.6	17.0	16.6	16.9	12 791	26 861
PL	34.4	30.5	27.8	27.8	27.2	3 015	6 332
PT	25.0	26.0	24.9	25.3	24.4	5 046	10 596
RO	45.9	44.2	43.1	41.4	40.3	1 270	2 667
SI	17.1	18.5	17.1	18.3	19.3	7 199	15 119
SK	21.3	20.6	19.6	20.6	20.6	3 784	7 945
FI	17.4	17.4	16.9	16.9	17.9	13 096	27 501
SE	13.9	14.9	15.9	15.0	16.1	13 504	28 358
UK	22.6	23.2	22.0	23.2	22.7	10 281	21 591
IS	13.0	11.8	11.6	13.7	13.7	11 384	23 907
NO	16.5	15.0	15.2	14.9	14.5	21 838	45 859
CH	17.9	18.6	17.2	17.2	17.2	20 362	42 759

AROPE across European countries (Year 2014)



AROPE (2)

- Poor theoretical grounding
- Mixes relative measures (60% of the median) with absolute ones (deprived in 4 out of 9 items).
- Union approach might lead to an overestimation of poverty levels.

Summary

- MDP measures offer a more complete / comprehensive perspective of well-being deprivation.
- Yet, haunted by many technical problems
  - Choice of relevant dimensions?
  - Data availability
  - Identification method?
  - Aggregation method?
  - Preferences are typically not taken into account (Decancq, Fleurbaey & Maniquet 2015 is an exception).
  - Critics to the approach (e.g. Ravallion): *ad hoc* aggregation and unexplained tradeoffs between domains.

Multidimensional poverty: theory and empirical evidence

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Future challanges

- Trade-offs variability across dimension pairs.
- Current methods assume constant elasticity of substitution among **all dimension pairs**.
- **Crucial implications** for poverty eradication programs.