SMALL AREA METHODS FOR MONITORING OF POVERTY AND LIVING CONDITIONS IN EU

Jean Monnet Chair
European Commission
UNIVERSITÀ DI PISA

PISA, 8-10 MAY 2018

WORKSHOP "SMALL AREA METHODS AND LIVING CONDITIONS INDICATORS IN EUROPEAN POVERTY STUDIES IN THE ERA OF DATA DELUGE AND BIG DATA"

FINAL EVENT OF THE JEAN MONNET CHAIR SAMPLEU

How to synthetize the dimensions?

- Horizontal heterogeneity
- Degree of substitutability between dimensions
- Data normalization / standardization / harmonization

Three aspects closely interconnected

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How to synthetize the dimensions?

Synthesis as a tool to measure, summarise, and rank observations (individuals, municipalities, countries…)

In its basic form, it is usually a function

$$f: \mathbf{X} \longrightarrow R$$

where X is the data matrix with generic entry x_{ij} representing the *j*-th achievement for unit *i*

How to synthetize the dimensions?

Common distinction:

- Counting measures (e.g. Alkire-Foster, Headcount ratio…)
- Index measures (e.g. Human Development Index, averages…)

Formal distinction? They are both functions from the set of X_{nxk} matrices to a real value

•Central role of the underlying assumptions (sometimes not very transparent)

Background

Horizontal and vertical aggregation

0.2	0.5	0.2
0.5	0.5	0.8
0.8	0.6	0.4

Data matrix

Horizontal and vertical aggregation

0.2	0.5	0.2	**0.3**
0.5	0.5	0.8	**0.6**
0.8	0.6	0.4	**0.6**

Within-unit aggregation

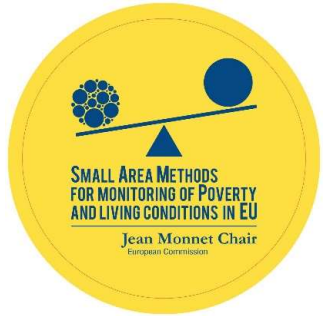
Horizontal and vertical aggregation

0.2	0.5	0.2	**0.3**
0.5	0.5	0.8	**0.6**
0.8	0.6	0.4	**0.6**
			0.5

Between-unit aggregation

Horizontal and vertical aggregation

0.2	0.5	0.2	**0.3**
0.5	0.5	0.8	**0.6**
0.8	0.6	0.4	**0.6**
			0.5



Horizontal and vertical aggregation

0.2	0.5	0.2	**0.3**
0.5	0.5	0.8	**0.6**
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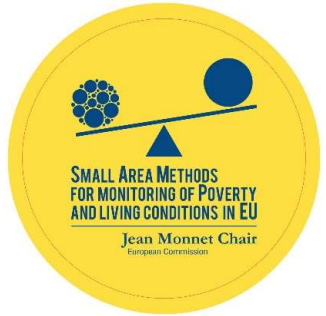
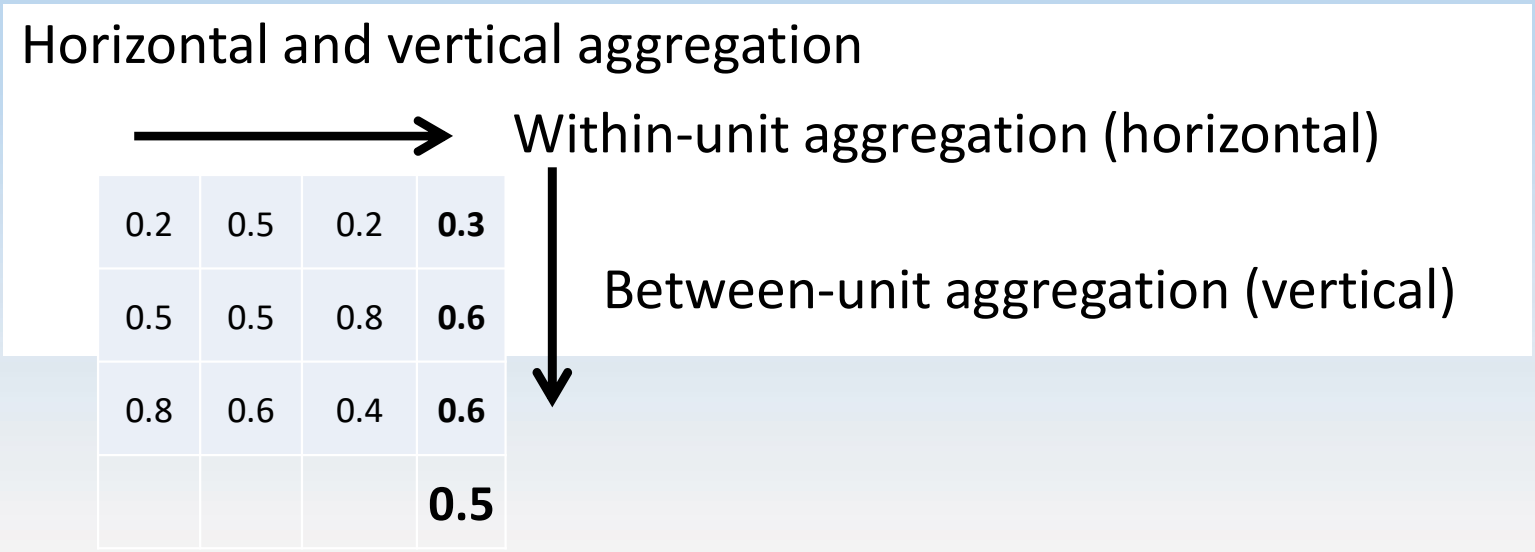


Horizontal and vertical aggregation



0.2	0.5	0.2	**0.3**
0.5	0.5	0.8	**0.6**
0.8	0.6	0.4	**0.6**
			0.5

These two phases are conceptually different and should be kept separated (e.g. inequality)

Horizontal inequality can be the result of a choice → Need to take it into account

Taking into account Horizontal heterogeneity

Higher-order means

Geometric mean (HDI)

Mazziotta-Pareto index (explicitly)

There is an *inescapable arbitrariness* in the choice of the order g (Anand and Sen, 1997)

A way to penalise heterogeneity
(the higher the heterogeneity, the higher the penalisation)

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MSI (Mauro, Biggeri, Maggino 2017)

$$I_i = 1 - \left[\frac{1}{k} \sum_j (1 - x_{ij})^{g(x_i)} \right]^{\frac{1}{g(x_i)}}$$

g is a function of the i-th row of achievements for unit i

A mean: focusing on the general well-being
Income: leverage to access other dimensions
Environment, Freedom, etc…: high flexibility

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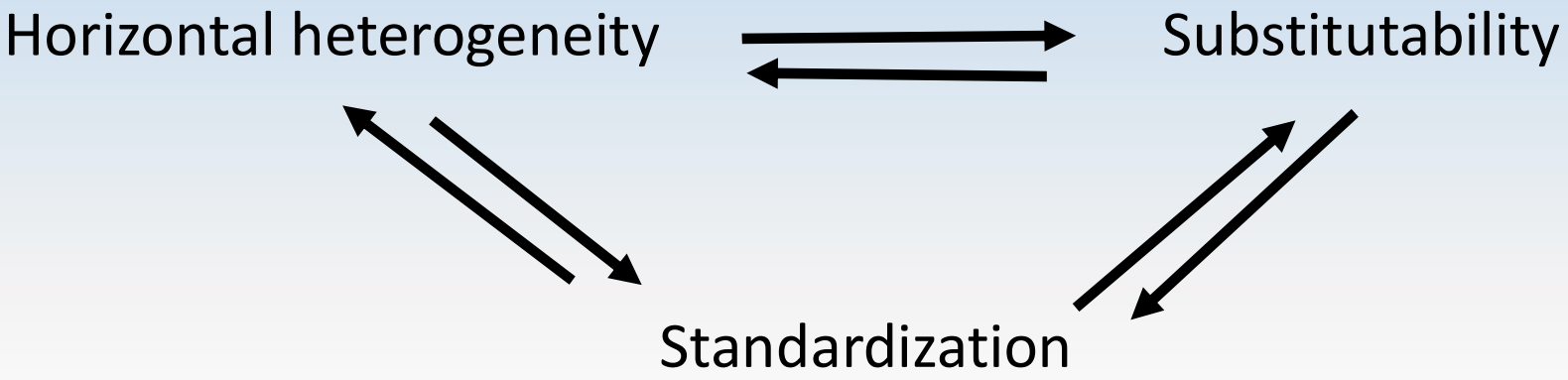
It is crucial to define a theoretically sound process of standardization

- Old issue: Implicit weighting issues
- New issue: Biased variability it might introduce

The three aspects are closely interconnected



Conclusions

These three aspect are crucial especially when the number of dimensions increases (Big Data framework), and when there is the need to tailor the measurements taking into account spatial (Small Areas) and time dynamics (monitoring over time).

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Thank you for your attention !