Comparative Measurement of Educational and Occupational Status

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Conclusions

• Comparable measurement is best achieved by scaling, not by common denominator harmonization.
• Best scaling is optimal scaling.
• Scaling may lead to aggregation error; aggregation error is random error and typically very small.
• Considerable gains in (comparative) measurement can be achieved by double indicator measurement.
• Correction for attenuation (by double indicator measurement) can have dramatic consequences for structural effects, in particular for mediating and confounding variables.
Common denominator harmonization

• Common denominator == largest common elements

• Main disadvantages:
  – Loss of information
  – Common elements may be hard to find
  – These problems become more severe, when you have more data!!
Harmonization by scaling

• Assume that there exists a single common, continuous dimension underlying the empirical indicators.
• Scale the indicators to this dimension
• Optimal scaling of a variables bring the indicators closest the latent dimension.
E.g.: harmonizing crude measures of age

• Suppose you would have two data sources. One categorizes age 21-30, 31-40, 41-50 etc. the other as 26-35, 36-45, 46-55.
• Nobody would ever think of common denominator harmonization in this situation.
• In stead: SCALE the categories with respect to ‘typical age’, such as category midpoint.
• This leads to ‘aggregation error’:
  – Aggregation error is a random error (attenuates correlations).
  – Aggregation error is typically very small if N-categories > 4.
  – If in need, aggregation error can be estimated and a disattenuation procedure may be applied.
Political parties

• Political party system are institutionally organized and very country specific.

• However, they are still comparable in many respects, e.g. with respect to government intervention, anti-immigrant, environmental policies.

• It is a bad idea to harmonize political parties ex ante.

• Post-hoc harmonization assigns a unique ID to each party and organizes this information in a transparent way to the end user.

• The end user will apply scaling to test hypotheses.
Occupations and educations

• Harmonizing occupations is like age.
• Harmonizing educations is like political parties.
ISCO

• Occupational hierarchies are:
  – Very stable across time and age (the ‘Treiman constant’)
  – Detailed international classifications have been available since the 1950’s: ISCO-58 → ISCO-68 → ISCO-88 → ISCO-08. ILO.

• National classifications can be converted into ISCO without much loss of information.

• Such cross-walks have been made available via my ISMF website and have been used by many.
Different ways to scale occupations

• Prestige: Subjective evaluations of desirability of occupations: Treiman’s (1977) Standard International Occupational Prestige Index [SIOPS].

• Social distance: friendship of marital associations between occupations. Meraviglia et al. (2016) ICAM scale.


• These three types of scaling are related, but far from identical.
Occupational classes

• Occupational classes [typology] are often used in mobility / reproduction analysis.

• With good reasons -- direct inheritance of occupations:
  – is strong,
  – unrelated to occupational status,
  – can severely bias summaries of association patterns (such as a simple correlation).
EGP / ESEC / ISEC

• The most often used class typology is the EGP by Erikson, Goldthorpe & Portocarero (1979).
• Its relationship to ISCO has been established by Ganzeboom et al., 1989, 1992, 2003.
• ESEC: Rose & Harrison, 2009.
• ISEC: Ganzeboom, Luijkhx & Treiman, 2018.
Occupational class typologies

• EGP / ESEC / ISEC combine three occupational attributes:
  – Occupational title [ISCO]
  – Self-employment / Entrepreneurship [SEMPLE]
  – Number of subordinates [SUPVIS]

• These attributes were to some extent all present in ISCO-68, absent in ISCO-88, and partly restored in ISCO-08.
Occupational classes and status scores

• One possible perspective on the relationship between occupational classes and occupations status scores is that occupational classes are about *what* is being scaled, not about *how* it is scaled.

• Empirically, EGP scaling closely conforms to SEI scaling of the categories.
The story of SEI and ISEI

- Duncan (1961) created his SEI scale as a weighted average of typical education and typical earnings to generate ‘a prestige score for all occupations’.
- However, Duncan’s SEI construction has little to do with prestige.
- Duncan’s important finding was that the constructed SEI scores worked better than prestige scores for the same occupation (pointed out by Featherman & Hauser).
- ISEI purges the prestige criterion from the construction and defines the socio-economic status of occupation as an optimally scaled intervening variable.
ISEI model

EDUCATION ← OCC1 ← OCC2 ← OCCk → EARNINGS

minimal
The cost of being crude

• Comparisons of ISEI construction of 4-digit, 3-digit, 2-digit occupation data and EGP classified data showed that very little aggregation bias occurred.

• This is confirmed by research with crude (precoded) occupation questions (Ganzeboom, 2005; De Vries & Ganzeboom, 2008).
Harmonizing education

• Educations are very much like political parties in comparative research.
  – Highly institutionalized
  – Very strong country specific terminology

• A crucial element in harmonizing education is to preserve the original country-specific classification.

• Education systems often change within countries; in general-population samples we typically find persons who have been exposed to different educational systems, between and within countries.
• ISCED-1967 and ISCED-1997 did not provide a systematic coding frame for national educational classifications.

• First digit ISCED (‘level’) was typically used as a common denominator framework, leading to very crude renditions of education systems, in particular at the secondary level.

• This was rather disastrous.
Country-specific educations

• Both ESS and ISSP measure and archive country-specific educational classifications (between 5 and 20 categories).

• This information is hardly ever used:
  – Country specific terminology
  – Inconsistent because of historical changes
  – It is an immense amount of information.
ISLED

• ISLED: International Standard Level of Education. Aims to construct an interval scale that is internationally comparable.

• Step 1: merge country-specific educations (ESS R1-R4) into a single categorical variables.

• Step 2: Scale the categories as an optimal intervening variable between inputs (parental status) and outputs (occupation and partners education). ISEI methodology. Schröder & Ganzeboom, 2014.
ISLED model

INPUTS
Parents educ
Parents occs

EDU1

EDU2

EDUk

OUTPUTS
Occupation
Partners educ

minimal
ISCED 2011

• ISCED 2011 is different from its predecessors:
  – 3 digit classification (36 categories)
  – Most national classifications have a 1-to-1 relationship with ISCED-2011.
  – This implies that national classifications can now be coded using 3-digit ISCED without loss of information.
  – ESS started to adopt this coding system in R7. In ISSP there is a proposal to adopt it.
ISLED for ISCED-2011

• Schröder (2014: Chapter 3) has generated an ISLED scale for the ISCED 2011 categories.

• Analysis with double indicators confirms that there is no appreciable loss of information in using a common scaling for ISCED-2011 in ESS countries.
Double indicator measurement

• Measurement reliability can be examined by (independent!) double indicator measurement.
  – Education: qualifications and duration.
  – Occupation: detailed and crude classification.

• The quality of the second indicator is not of primary concern: it may be bad, but it can still show imperfections in the first measure.

• Two indicators are not enough to estimate measurement reliability of each. However, it can be done by using auxiliary variables.
Reliability estimates with auxiliary variables
MTMM models

• When double indicator measurement is repeated on two constructs, we can trace invalidity or systematic measurement error.


• Education: repeat double measurement for respondent – spouse. Data are hard to find.
MTMM model

Y1

y11

y12

Y2

y21

y22
Results of double indicator measurement

• Double indicator measurements show parallel indicators of education / occupation generally to be very reliable and insensitive to systematic error.

• However, is the same time they show that even low levels of unreliability have enormous consequences for effect sizes and causal conclusions, in particular when education ./ occupation are used as mediation or control variables.

• Researchers are largely unaware how measurement error has different effects of variables with different causal roles.