

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 systems 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.
- Socio-economic status: scale occupations with respect to typical [=required] education and typical earnings. [Duncan SEI scale]. Ganzeboom et al., 1992, 1996, 2003.
- 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, Luijkx & Treiman, 2018.

Occupational class typologies

- EGP / ESEC / ISEC combine three occupational attributes:
 - Occupational title [ISCO]
 - Self-employment / Entrepreneurship [SEMPL]
 - 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.

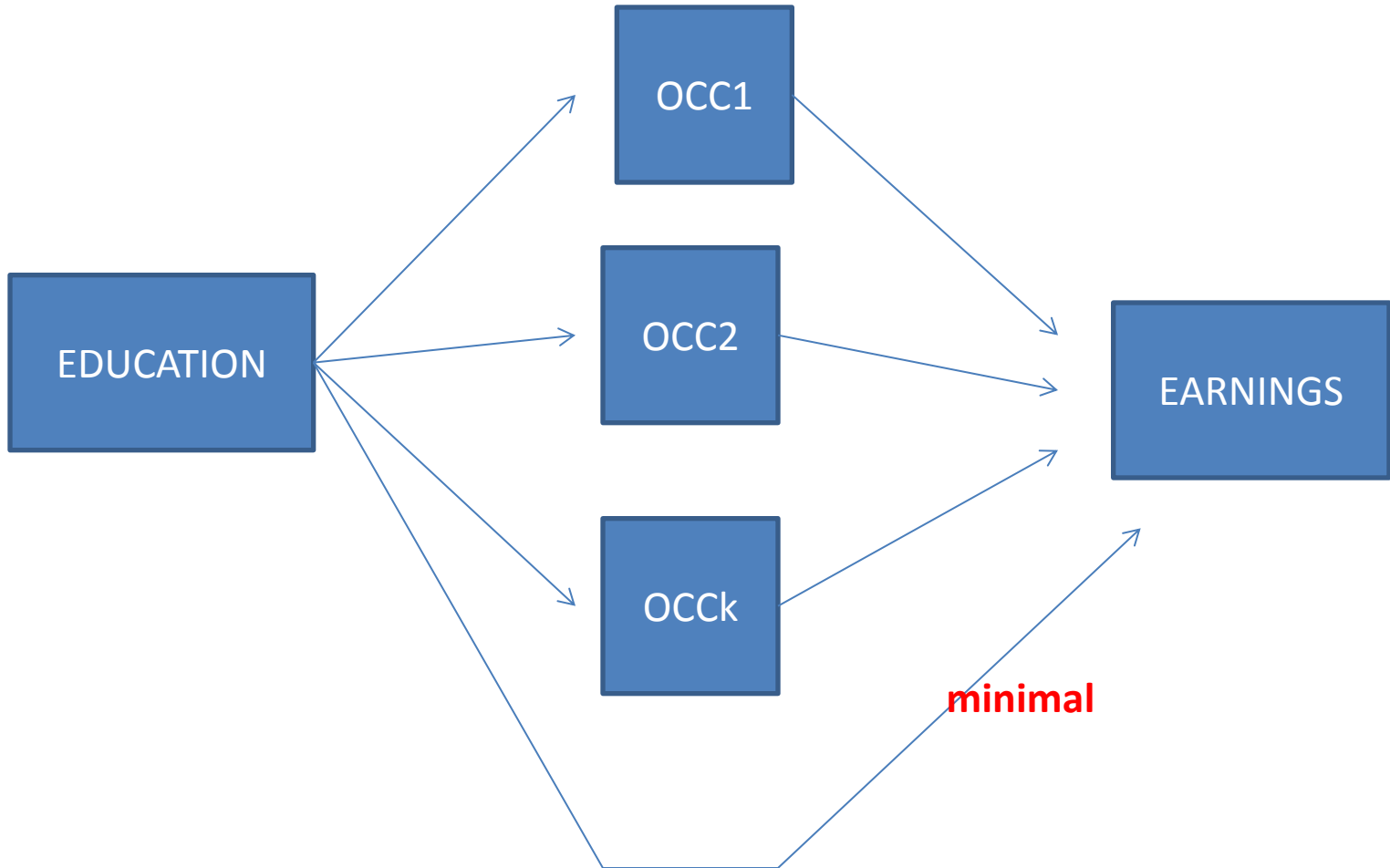
Occupational classes and status scores

- 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



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

- 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.

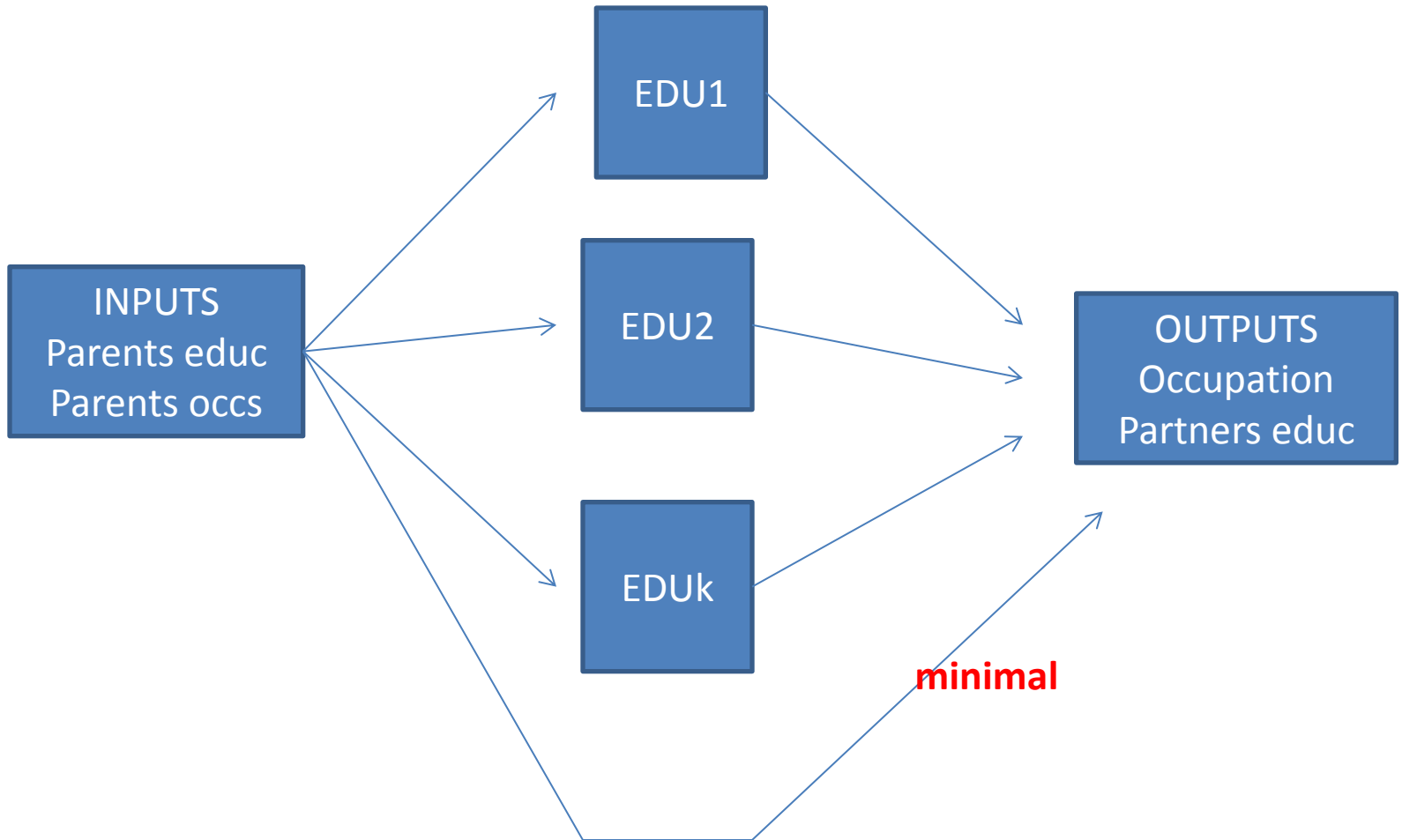
Country-specific educations

- 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



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.

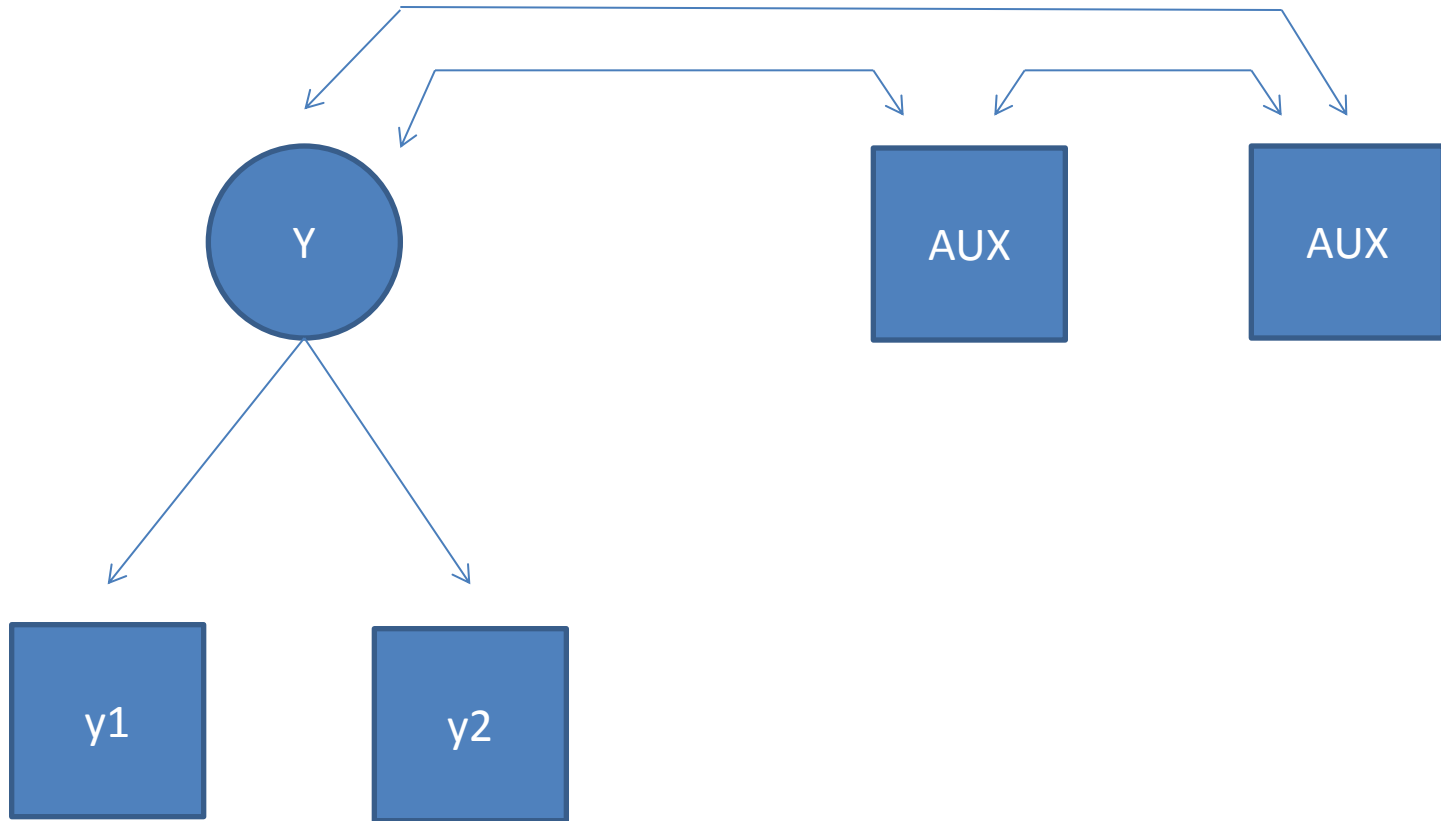
ISLED for ISCED-2011

- 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.

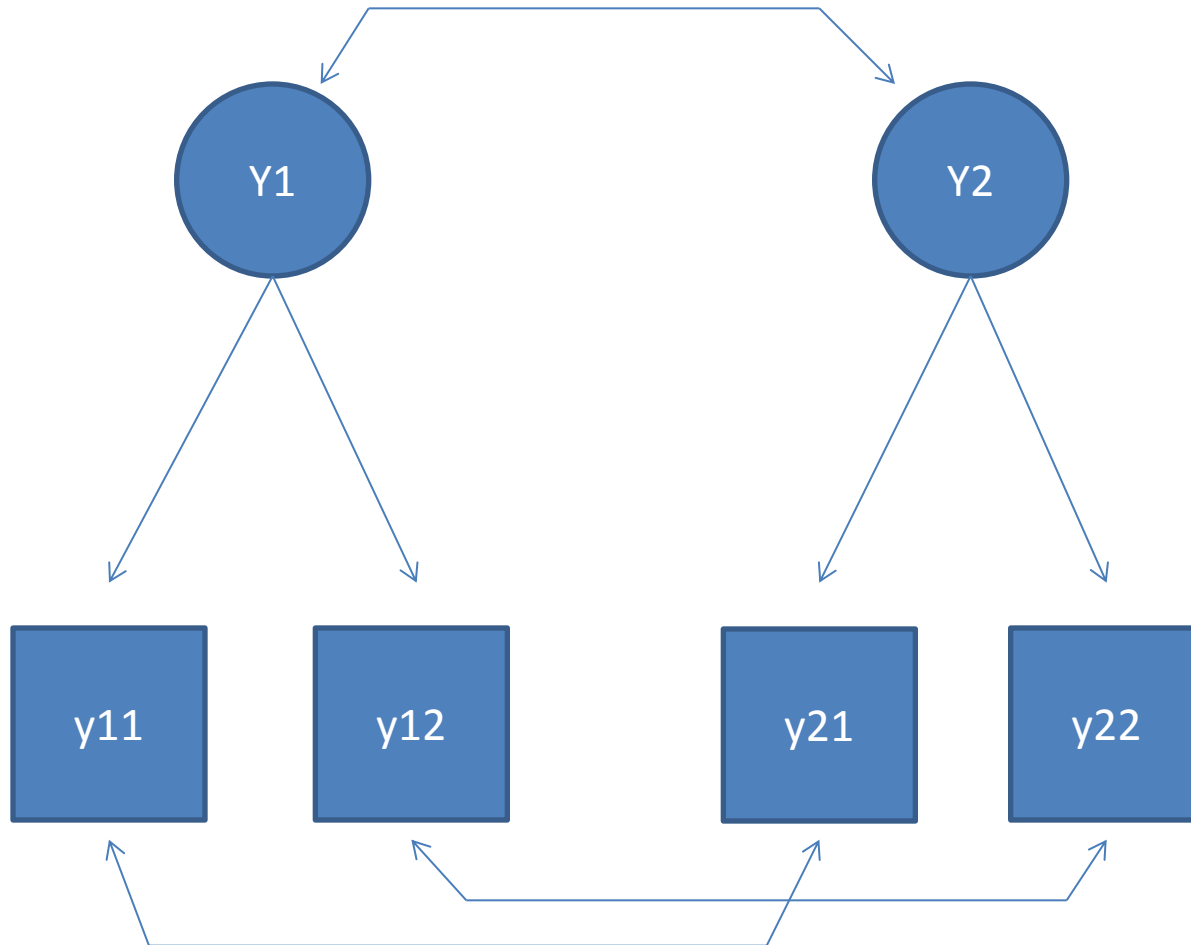
Reliability estimates with auxiliary variables



MTMM models

- When double indicator measurement is repeated on two constructs, we can trace invalidity or systematic measurement error.
- Occupations: repeat double measurement for father – mother – respondent – spouse.
- Education: repeat double measurement for respondent – spouse. Data are hard to find.

MTMM model



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, at 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 on variables with different causal roles.