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Introduction to the OECD Handbook on composite indicators[1]

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[1] This presentation was prepared for the workshop. The views expressed are those of the author and do not necessarily reflect the views of the BIS or the central banks and other institutions represented at the workshop.
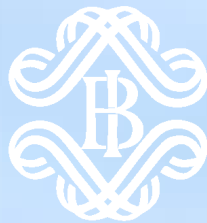
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Introduction to the OECD handbook on composite indicators

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What is the purpose of the handbook?

- The handbook is "a guide for **constructing and using** composite indicators (CIs) for policy makers, academics, the media and other interested parties".

- A CI is a **single number summarizing many phenomena**.

- Core dilemma on CIs: on the one hand they are **more accessible** to the public / more suited to debate compared to a wide array of single-issue indicators; on the other hand they entail a number of **potentially arbitrary choices** (components, aggregation strategies including weighting etc.)

- The handbook provides guidelines aimed at minimizing the arbitrary element by implementing **optimality principles** and communicating contents **transparently**

- CIs **may be suited for some phenomena and not for others!**

Some examples

- **Ease of Doing Business:** computed by the World Bank, covers sub-items on fiscal regulation, enforcement of contracts, access to credit etc.

- **Well-being:** "dashboard approach" (GDP, inequality, environmental quality, life satisfaction…) vs CI: ample discussion following the Sen-Stiglitz-Fitoussi report

- **Financial Development Index:** computed by the World Economic Forum, includes several dimensions ranging from risk of sovereign debt crisis to performance of capital markets

- **Technology Achievement Index:** computed by the UN, covers four dimensions of innovation; used as an example throughout the handbook
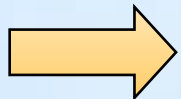
Financial inclusion is a multi-dimensional phenomenon (access/usage; households/firms; actual/perceived etc.) hence a natural candidate for CIs

From the handbook: pros and cons of CIs

Pros:	Cons:
• Can summarise complex, multi-dimensional realities with a view to supporting decision-makers.	• May send misleading policy messages if poorly constructed or misinterpreted.
• Are easier to interpret than a battery of many separate indicators.	• May invite simplistic policy conclusions.
• Can assess progress of countries over time.	• May be misused, *e.g.* to support a desired policy, if the construction process is not transparent and/or lacks sound statistical or conceptual principles.
• Reduce the visible size of a set of indicators without dropping the underlying information base.	• The selection of indicators and weights could be the subject of political dispute.
• Thus make it possible to include more information within the existing size limit.	• May disguise serious failings in some dimensions and increase the difficulty of identifying proper remedial action, if the construction process is not transparent.
• Place issues of country performance and progress at the centre of the policy arena.	
• Facilitate communication with general public (*i.e.* citizens, media, *etc.*) and promote accountability.	• May lead to inappropriate policies if dimensions of performance that are difficult to measure are ignored.
• Help to construct/underpin narratives for lay and literate audiences.	
• Enable users to compare complex dimensions effectively.	

Choices involved in the creation of a CI

1) Development of a theoretical framework

2) Choice of individual indicators to draw upon

3) Data treatment/analysis for individual indicators

4) Weighting and aggregation of individual indicators

5) Sensitivity and robustness analysis for the CI(s)

6) Reverse engineering (performance of CI vs individual indicators)

7) Choice of a presentation/visualization strategy

8) Analysis of the CI(s) in relation to other relevant variables

Theoretical framework

Conceptual exercise: what is it that we want to measure? What is the nature of the phenomenon and what are its components? May draw on economic theory, policy practice etc; should be theoretically sound, detailed, structured (input/output/process components) and appropriate to the goal chosen for the CI

Examples: financial inclusion as defined by the Indian Economic Service is first articulated around the "where"; the G20 Action Plan is first articulated on the "what", i.e. access, usage, quality, formality and impact of financial services. Likely to point out different weaknesses at first sight!

Choosing individual indicators

Step	Why it is needed
2. Data selection Should be based on the analytical soundness, measurability, country coverage, and relevance of the indicators to the phenomenon being measured and relationship to each other. The use of proxy variables should be considered when data are scarce (involvement of experts and stakeholders is envisaged at this step).	• To check the quality of the available indicators. • To discuss the strengths and weaknesses of each selected indicator. • To create a summary table on data characteristics, *e.g.*, availability (across country, time), source, type (hard, soft or input, output, process).

Data treatment and analysis (individual indicators)

- Imputation of missing values: analysis of missingness patterns (MCAR, MAR...); single/multiple imputation; model-based/hotdeck...; strategy for outliers; trimming of input/output.

- Dimensionality-reducing multivariate analysis: principal component/factor/ correspondence/cluster analysis to detect correlation patterns in the data, check for relevance of variables, decomposition of variance, influence of individual dimensions on (some) optimal linear aggregations.

- Normalization: ranking, qualitative scores, standardization, benchmarking etc. to avoid the apples-and-oranges problem

Weighting and aggregation

• Trickiest part of the process! Once dimensions are selected, their relative relevance needs to be determined. Weighting: is access to microcredit more or less important than access to affordable health insurance? Aggregation: should financial literacy enter a CI indicator of inclusion arithmetically or geometrically?

• Major issue at stake: marginal utility of each dimension, hence trade-off between indicators (compensation: good or bad?)

• Should be very soundly justified from a theoretical standpoint; a measure of data-driven choices (e.g. to account for correlation) is OK but such choices should be transparent

Sensitivity and robustness analysis

Standard good econometric practice (results should not be excessively sensitive to methodological choices). Effects of...

1. Inclusion and exclusion of individual indicators.
2. Modelling data error based on the available information on variance estimation.
3. Using alternative editing schemes, *e.g.* single or multiple imputation.
4. Using alternative data normalisation schemes, such as Mni-Max, standardisation, use of rankings.
5. Using different weighting schemes, *e.g.* methods from the participatory family (budget allocation, analytic hierarchy process) and endogenous weighting (benefit of the doubt).
6. Using different aggregation systems, *e.g.* linear, geometric mean of un-scaled variables, and multi-criteria ordering.
7. Using different plausible values for the weights.

Reverse engineering, or back to the original data
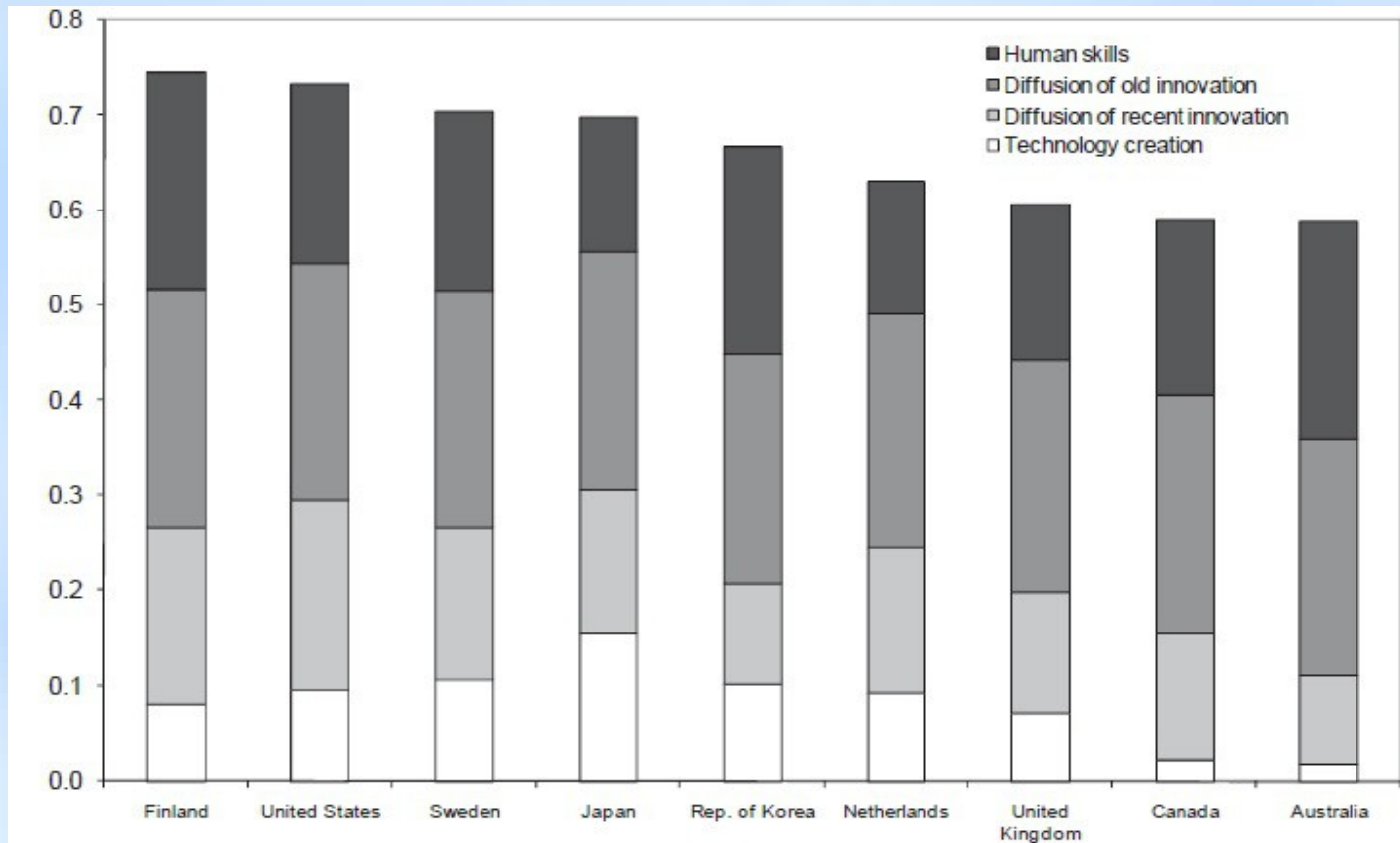
Note: Contribution of components to overall Technology Achievement Index (TAI) composite indicator. The figure is constructed by showing the standardised value of the sub-components multiplied by their individual weights. The sum of these four components equals the overall TAI index.

# Presentation and visualization strategies

Appropriate representation depends on core message: e.g. tabular representation (rankings) draws attention on the best overall performer, spider diagrams emphasize the differences on individual dimensions between a chosen country/group and others... should be clear, consistent, transparently motivated.
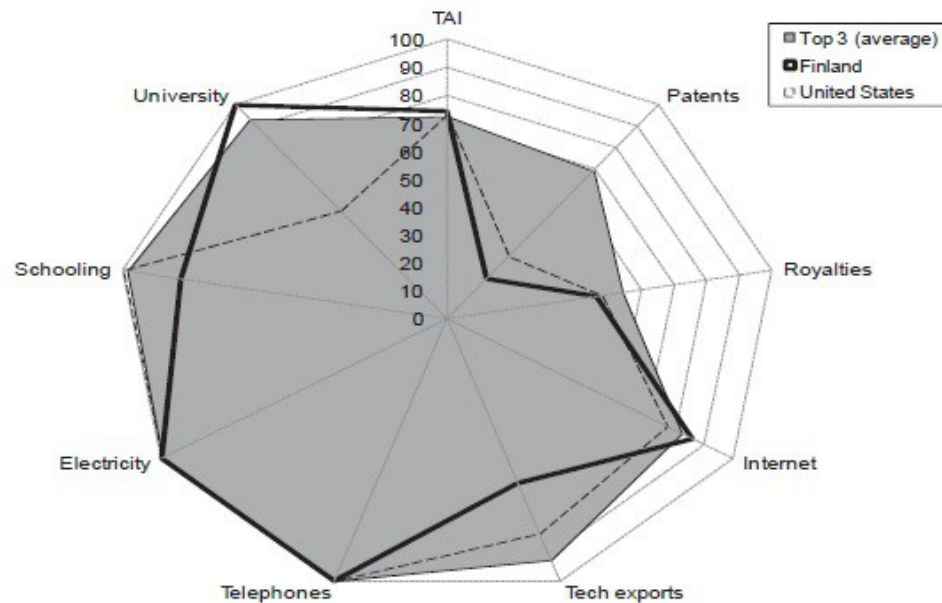
Note: Technology Achievement Index (TAI). Finland is compared to the top three TAI performers and to the United States. The best performing country for each indicator takes the value 100, and the worst, 0.

Relationship to other relevant variables
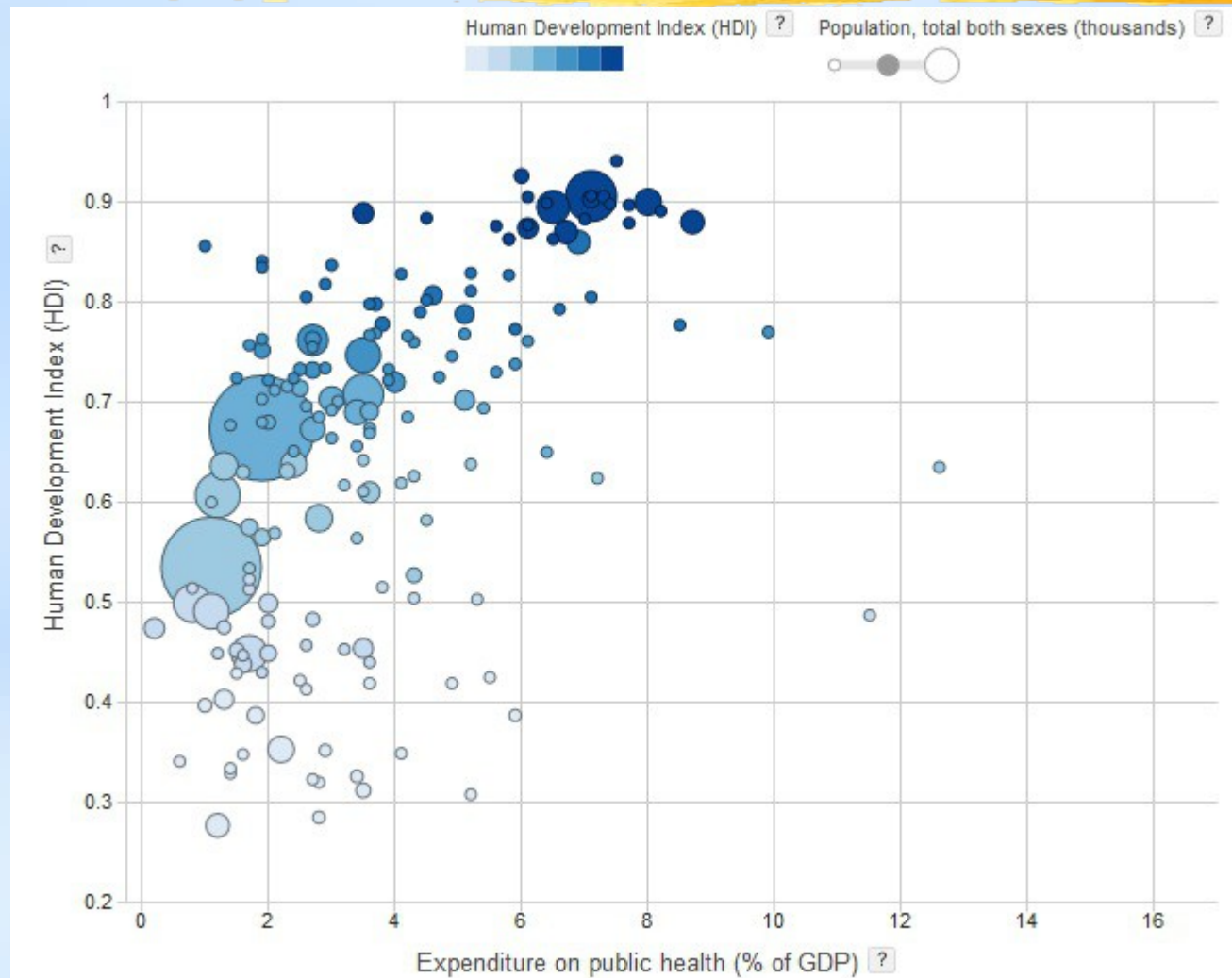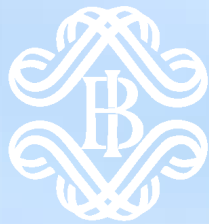
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Thank you for your attention!