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COMPOSITE INDICATORS BETWEEN ANALYSIS AND ADVOCACY

ABSTRACT. We explore to what extent composite indicators, capable of aggregating multi-dimensional processes into simplified, stylised concepts, are up to the task of under-pinning the development of data-based narratives for political advocacy. A recent OECD working paper (Nardo et al., 2005, Handbook on constructing composite indicators: methodology and user guide, OECD statistics working paper, STD/DOC(2005)3) offering 'recommended practices' for the construction of composite indicators is briefly illustrated, together with 'pros' and 'cons' associated with the use of aggregated statistical information. An attempt is made to summarise the terms of the controversy surrounding the use of composite indicators with practical and applied examples, as well as the mostly advocacy-driven spread of these measures in recent years. As an example, we focus on desirable narratives in support of the so-called Lisbon strategy and its ongoing revision, following one of the recommendations of a recent EU study [Kok: 2004, The High Level Group on Lisbon Strategy chaired by Wim Kok, Facing the Challenge, European Communities, Luxembourg, 2004] on how to streamline and reinvigorate the EU's Lisbon Agenda. Finally we try to establish a link between the use of composite, even for analytic purposes, and the development of a robust culture of evaluation of policies based on information [Messerlin: 2005, 35th Wincott Lecture, October 3, 2005]. Of these, we try to offer stylised examples – also from the recent literature [Sapir: 2005, Globalisation and the Reform of European Social Models, 2005, http://www.bruegel.org/] where composite indicators are used.

KEY WORDS: composite indicator, narrative, advocacy, Lisbon objectives

This brief note discusses the relevance of composite indicators or indices for advocacy and for the construction of data-based narratives.

We use here "composite indicator" *sensu lato*, i.e. to indicate a manipulation of individual indicators, and possibly weights, to produce an aggregate ordinal or cardinal measure of country performance. Weights may represent the relative importance of each indicator or be implied by the data, and the manipulation may involve linear or geometric combination, use of outscoring matrix in a multicriteria setting or other. For the purpose of this work we also include as composite indicators simple aggregate measures of country performance achieved by averaging of the ranks given by the

individual variables to each country, as well as scores given in the form of stars or other visualisation expedient.

The construction of a composite indicator is not straightforward and involves assumptions which have to be assessed carefully, least the process results in a product of dubious analytic rigour. In Nardo et al. (2005a) an attempt has been made to map the effect of each assumption on the quality of the aggregation, and to indicate to the practitioner a stylised 'checklist' to be followed in the construction. The authors in particular point to the need for an explicit conceptual framework for the index, and the usefulness of multivariate analysis prior to the aggregation of the individual indicators. Also reviewed are the tools available for imputation of missing observation, the methodologies for weighting and aggregation, the testing of the robustness of the composite using uncertainty and sensitivity analysis (Table I).

TABLE I

From Nardo et al. (2005a), steps for the construction of composite indicators

Theoretical framework – A theoretical framework should be developed to provide the basis for the selection and combination of single indicators into a meaningful composite indicator under a fitness-for-purpose principle.
Data selection – Indicators should be selected on the basis of their analytical soundness, measurability, country coverage, relevance to the phenomenon being measured and relationship to each other. The use of proxy variables should be considered when data are scarce.
Multivariate analysis – An exploratory analysis should investigate the overall structure of the indicators, assess the suitability of the data set and explain the methodological choices, e.g., weighting, aggregation.
Imputation of missing data – Consideration should be given to different approaches for imputing missing values. Extreme values should be examined as they can become unintended benchmarks.
Normalisation – Indicators should be normalised to render them comparable.
Weighting and aggregation – Indicators should be aggregated and weighted according to the underlying theoretical framework.
Robustness and sensitivity – Analysis should be undertaken to assess the robustness of the composite indicator in terms of e.g., the mechanism for including or excluding single indicators, the normalisation scheme, the imputation of missing data and the choice of weights.
Links to other variables – Attempts should be made to correlate the composite indicator with other published indicators as well as to identify linkages through regressions.
Visualisation – Composite indicators can be visualised or presented in a number of different ways, which can influence their interpretation.
Back to the real data – Composite indicators should be transparent and be able to be decomposed into their underlying indicators or values.

This methodological work, an analysis of good practises in composite indicator building jointly prepared by the OECD and a statistic unit of JRC, appears timely. A search on ''Composite Indicators'' run in October 2005 on Scholar Google gives 992 hits, while on plain Google there are 35,000. A recent compilation of existing CI lists 127 such measures. Most of these were developed in the last four years (JRC, 2006). Several reviews of composite indicators were published in the last three years. The EC has used or uses composite indicators for Internal Market, Innovation, Knowledge-Based Economy, and companies' readiness to take up e-business (e-Readiness, Saisana and Tarantola, 2002), while in a recent note (EC, 2005b) the European Commission lists under ''being improved'' or ''being developed'' the following indicators for the structural indicators database (SI, 2005):

1. Price convergence between EU Members States
2. Healthy Life Years
3. Biodiversity
4. Urban population exposure to air pollution by ozone and
5. Urban population exposure to air pollution by particles (PM10)
6. Consumption of toxic chemicals
7. Generation of hazardous waste
8. Recycling rate of selected materials
9. Resource productivity
10. E-business

All these appear to be composite indicators in one way or another. For example, Resource Productivity is defined as the ratio of Gross Domestic Product (GDP, at constant prices) to Domestic Material Consumption (DMC), and is hence the ratio of two composites.

All this interest in composite indicators may be attributed to a variety of reasons, which could include the following (Saisana and Tarantola, 2002; Nardo et al., 2005a, b):

- Composite indicators can be used to summarise complex or multi-dimensional issues, in view of supporting decision-makers.
- Composite indicators provide the big picture [...]. They facilitate the task of ranking countries on complex issues.
- Composite indicators can help attracting public interest [...].
- Composite indicators could help to reduce the size of a list of indicators [...].

As far as decision makers are concerned, it is likely that for policy action individual variables and quantitative analyses (e.g. cost-benefit) are more relevant than an aggregate measure. An index remains useful to make a point for action, e.g. on the relative position of a country, when this is of use in political discourse. Distilling the "pros" above to their essence, one might argue that the construction of CIs is driven by the need for advocacy, whose rationale can be mainly identified in the generation of narratives supporting the subject of the advocacy.

Yet the use of composite indicators is very much the subject of controversy, pitting aggregators against non-aggregators. Sharpe (2004) notes that:

> The aggregators believe there are two major reasons that there is value in combining indicators in some manner to produce a bottom line. They believe that such a summary statistic can indeed capture reality and is meaningful, and that stressing the bottom line is extremely useful in garnering media interest and hence the attention of policy makers. The second school, the non-aggregators, believe one should stop once an appropriate set of indicators has been created and not go the further step of producing a composite index. Their key objection to aggregation is what they see as the arbitrary nature of the weighting process by which the variables are combined.

One may note that the controversy on the use of statistical indices unfolds along an *analytic* versus *pragmatic* axis. There is abundant literature on the *analytic* problems associate to even well-established statistical indices such as GDP, which we do not review here (see Rifkin, 2004, p. 70 and following, for a discussion). This literature hardly seems to dent GDP's rather universal *pragmatic practical* acceptance.

Along similar lines, in Saisana et al. (2005), one reads

> [...] it is hard to imagine that debate on the use of composite indicators will ever be settled [...] official statisticians may tend to resent composite indicators, whereby a lot of work in data collection and editing is "wasted" or "hidden" behind a single number of dubious significance. On the other hand, the temptation of stakeholders and practitioners to summarise complex and sometime elusive processes (e.g. sustainability, single market policy, etc.) into a single figure to benchmark country performance for policy consumption seems likewise irresistible.

A different perspective on the controversy is offered by Jochen Jesinghaus (personal communication; see also http://esl.jrc.it/dc/esi_2005/esi_fvi.htm), developer of the Dashboard of Sustainability, a popular scoreboard visualisation tool:

> If CI's came from EUROSTAT [the EU Statistical Office], the additional information about the weight of a problem (hypothetical example: "CO_2 has an importance of 25% for environmental policy") would suddenly become as "official" as "9.5 tonnes of CO_2 per capita and year." While there is little controversy about the tonnes (maybe it's 9.1 or 10.2, but would it matter?), the opinions about the weights differ considerably; for example, CO_2 and energy have a weight of roughly two thirds in the Ecological Footprint but only 2% in the Environmental Sustainability Index of Yale & Columbia Universities. This explains the reluctance of statistical services to

give the "official quality" stamp to the weights. It is not an excuse, though, for not giving this information to the voter who, in a democratic society, has a right to know whether CO_2 emissions are as important as biodiversity loss or the pollution of rivers.

Incidentally, in this remark Jesinghaus assumes a commensurability between value-laden issues such as CO_2 emission and biodiversity. It can be argued that in a democratic society both the commensurability and the relative weights (if appropriate) should be the subject of the negotiation, possibly stimulated by the ongoing debate on aggregate sustainability measures. Social multi-criteria have been suggested as a tool to frame these debates (Munda, 2004).

Among the list of objections to the use of composite indices one reads (Saisana and Tarantola, 2002; Nardo et al., 2005a, b):

- Composite indicators may send misleading, non-robust policy messages if they are poorly constructed or misinterpreted [... or] may invite politicians to draw simplistic policy conclusions [...]
- The construction of composite indicators involves stages where judgement has to be made: the selection of sub-indicators, choice of model, weighting indicators and treatment of missing values etc. [...]
- There could be more scope for disagreement among Member States about composite indicators than on individual indicators [...].
- The CI increase the quantity of data needed because data are required for all the sub-indicators and for a statistically significant analysis.

While the first 'con' is simply a reminder that sound practices must be used (Nardo et al., 2005a; Saisana et al., 2005), and the last is an unavoidable consequence of complexity, the core of the non-aggregators' argument is in the subjective nature of these measures. Cherchye et al. (2005), observes that the "*lack of consensus*" is a defining property of composite indicators, and that while one may hypothesise a consensus between the association of key variables with the subject of the index, weights will remain controversial. According to Nardo et al., (2005a):

Composite indicators are much like mathematical or computational models. As such, their construction owes more to the craftsmanship of the modeller than to universally accepted scientific rules for encoding. As for models, the justification for a composite indicator lies in its fitness to the intended purpose and the acceptance of peers (Rosen, 1991).

The purpose for whom, one may ask. A given constituency may come to accept an aggregate measure (and reach compromise on weighting) on an index to be used to benchmark best practices (see e.g. the EC Internal Market Index, Tarantola et al., 2002, and the e-Readiness Business index, Nardo et al., 2004). A composite indicator of countries'

scholastic achievement or competitiveness proposed by an international organisation may lead to a much needed soul-searching exercise within constituencies of countries even if disagreement may exist on the measures themselves.

As an example of unfitness, if a composite indicator were to exacerbate disagreement among stakeholders, who would otherwise show readiness to accept a scoreboard, i.e. an un-aggregated list of the same variables, then there would be little point in insisting on weighting.

The point of these considerations is that subjectiveness and fitness need not be antithetical. They are in fact both at play when constructing and adopting a composite indicator, where inter-subjectivity may be at the core of the exercise, such as when participative approaches to weight negotiations are adopted (see Nardo et al., 2005a for a review). Thus these only apparently conflicting properties underpin CIs' suitability for advocacy.

In discussing data quality issues for statistical information Funtowicz and Ravetz note (in Uncertainty and Quality in Science for Policy, 1990):

[...] any competent statistician knows that "just collecting numbers" leads to nonsense [...] so in "Definition and Standards" we put "negotiation" as superior to "science," since those on the job will know of special features and problems of which an expert with only a general training might miss.

We would add that, however good the scientific basis for a given composite indicator, its acceptance relies on negotiation and peer acceptance.

As an example, we now move to desirable narratives in support of the so-called Lisbon strategy, the ambitious EU goal, set for the next decade, of becoming:

[...]the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment.

In a well-known report from the high level group the chaired by Wim Kok (2004), on how to streamline and reinvigorate the EU's Lisbon Agenda, one reads:

An ambitious and broad reform agenda needs a clear narrative, in order to be able to communicate effectively about the need for it." So that everybody knows why it is being done and can see the validity of the need to implement sometimes painful reforms. So that everybody knows who is responsible.

Lisbon, even in its simplified version, is a complex undertaking, whose structuring and description call for a multi-dimensional representation. We explore to what extent composite indicators, capable of aggregating multi-dimensional processes into streamlined, stylised concepts, are up to the task

of underpinning the development of narratives in support of the Lisbon process.

An first example of the 'fatal attraction' exerted by composite indicators on the media when discussing countries performance on the Lisbon agenda is in Saltelli et al. (2004). Here a newspaper, the UK-based Financial Times, published an article under the title 'Brussels points the finger at EU lax states'. The 'finger' in this case was a star-rating system of EU member countries (three star meaning *good*, one star *bad*) and was allegedly based on the Spring Report, European Commission 2004. Star ratings are particularly meaningful to FT readership as they were used e.g. for the UK NHS hospital rating. Of course the European Commission had neither 'flogged' nor star-rated, and the responsibility for collapsing a system of 14 so called 'Structural Indicators' to a star metric was all with the FT editors. Yet would the FT readership have been exposed to the EU spring report without such a salient summary?

One may argue that the cause for Lisbon, or for structural reforms in the EU, is advanced by the use of league tables such as that produced by the FT. This is surely the opinion of former EU Commissioner for Competition Mario Monti, who on the same journal (Monti, 2005) notes:

[...] it is a pity that attempts to use even comparatively bland measures – such as the ''naming and shaming'' of laggards – have been dropped. In other areas, such as the implementation of single-market legislation or state-aid controls, ''scoreboards'' have played a useful role in bringing peer pressure to bear on national decision-makers.

A well-known example of the use of composite indicators in the European Commission is in the context of the transition to a knowledge-based economy, an important objective reaffirmed in the revised Lisbon strategy in 2005 (EC, 2005a). The EC's first attempt to assess progress towards this important target indeed uses two ''composite indicators'' that focus on the 'knowledge dimension' of this transition (see e.g. EC – DG RTD, 2005).

Although the emphasis of this note is on the interplay between composite indicators and narratives, the use of composite indicators for analytic purposes should not be discounted. As an example, Sapir (2005), in making the case for a taxonomy of EU economic models among Mediterranean, Nordic, Anglo-Saxon and Continental, makes use of a plot of ''strictness of employment protection legislation,'' a composite, versus unemployment benefits. Likewise, the use of factor analysis by Nicoletti and co-workers in the analysis of e.g. product market regulation in OECD countries (Nicoletti et al., 2000). Composite indicators for practitioners are discussed in detail in Nardo et al. (2005a), a handbook of best practice for composite indicator building.

Returning to the discussion of the attraction exerted by composite indicators, another example is in the work of Amartya Sen, Nobel prize winner in 1998. Sen was initially opposed to composite indicators but was eventually seduced by their ability to put into practice his concept of 'Capabilities' ('the range of things that a person could do and be in her life,' Sen, 1989) in the UN Human Development Index.

Considering again the EU experience and the remark of Mario Monti, one might wonder whether leaders could have made more effective use of statistical information to build effective narratives to promote structural reform and growth in the EU.

One might contend that we are witnessing an increasing appetite in the economically literate press for statistic-based narratives. The media coverage of events such as the publishing of the World Economic Forum's World Competitiveness Index and the WEF Environmental Sustainability Index, or the OECD-PISA study, not to mention more specialised measures such as the Transparency International's *Corruption Index* or the Center for Global Development's *Commitment to development index* and many others is evidently on the rise.

Even statistical agencies such as the OECD do not refrain from extracting a powerful narrative from statistical data. '*OECD says deficits hurt children*' makes it to the frontpage headline of the FT:

> In an interview with the Financial Times, Jean-Philippe Cotis, chief economist of the Paris-based organisation with 30 member countries, said the failure of leading economies to face up to long-term budgetary realities would lead to inadequate capital accumulation and slower growth.[...] The consequence of inaction, he said, was that ''we are going to bequeath to our children a capital stock which will be grossly undersized'', he said. ''We are sacrificing our kids.''

(Giles and Daneshkhu, 2004). Whether one agrees or not, one can hardly deny that the narrative generated by the OECD chief economist is both powerful and effective.[1]

In the EU, the recent predicaments of the European Constitution have been blamed, among other things, on a poor communication between policy makers and their constituency. Even with respect to Lisbon, the EU flagship initiative, the lack of effective narratives has been noted, e.g. in the Kok report already mentioned.

The lack of effective narratives in support of the EU integration and enlargement process is all the more acute when compared to the proliferation of narratives opposing it:

- The stability pact 'strangles' the EU economies;
- EU regulations are a systemic hindrance to business;

- The Services Directive fosters 'social dumping' ... and the Polish plumbers poach French jobs.

That a persistent section of the EU elite rejects these narratives hasn't helped defuse them, as the results from constitutional referendums have shown. And, as a counter-proof, where are the narratives in favour of the EU constitutions? As noted by the Kok report on the Lisbon process, it is likely that much has still to be done in the direction of simplifying the agenda, increasing its ownership among EU citizens, improving its communication. President Barroso's website "Growth and Jobs" shows the laborious progress of this reformulation (http://europa.eu.int/growthandjobs/).

Reason would suggest that powerful, statistically and economically literate narratives could be created:

- To the effect that excessive deficits are passed on to future generation (the OECD example above);
- To the fact that simultaneously limiting labour and capital mobility within the EU25 implies capital migrating elsewhere (in support to the service directive);
- On the impact of systemic rigidities or distributional coalitions (in Mancur Olson's , 1984 sense) on growth?

Examples of such narratives are from André Sapir's recent work, already quoted (2005), i.e.

- The stricter the employment protection legislation of a model, the lower its employment rate.
- The lower the level of secondary education attainment, the higher the risk of poverty; by contrast, the extent of redistributive policy only plays a secondary role

These are just examples on which an abundant statistical and economic literature already exists, and not a manifesto for political advocacy, i.e. we are not advocating for any of the policies implied by these examples, be it that some of these can be seen as part of the Lisbon agenda. Our point is on the use of analytic tools, including when appropriate composite indicators, in support of policies in the Lisbon process.

We found a very similar position taken in a recent lecture from the French economist Patrick A. Messerlin (2005). Messerlin calls for a "*Vibrant Culture of Evaluation [...] relying on the best and most systematic cost-benefit analysis of concrete cases.*".

Interestingly, Messerlin also suggests focusing on specific items of the reform agenda, properly identifying for each item the opposing distributional coalition as well as the adequate narrative:

[...] Overcoming fears [...] cannot be done by a general argument about the benefits from regulatory competition. Such arguments convince only the already convinced [...] For instance, the question of whether large farmers who have been subsidized by the poorest consumers and by tax-payers during the last four decades have a ''right'' to be compensated deserves a thorough debate.

Messerlin calls for extensive use of "*regulatory impact assessments*", draws attention to the alliance between anti-global NGO's and "*a myriad of much more discrete lobbies primarily concerned with hanging on to the rents they derive from regulated markets*", and makes the point that effective analysis and communication should target these.

Maybe we can make more precise what we mean by data-driven (or economically arguable?) narratives with a counter example. An ambitious new meta-narrative of a redefined human mission to underpin the European Dream is invoked by Jeremy Rifkin (2004, p. 370). In this work the author defines the EU style of inclusiveness and tolerance against the American Dream of individual self-achievements and materialistic consumption. This kind of narrative may have appeal but does not repose on economic analysis. On the contrary, this kind of all encompassing narrative, often also seen in the work of the European Commission, has been the subject of criticism by academicians (Alesina 2000).

It is evident that analysis-based narratives would gain in effectiveness if one could increase EU citizens' statistical and economic literacy, which is also a main challenge to the approach defended in this work.

Amartya Sen remarks that:

[...] the ability to exercise freedom may, to a considerable extent, be directly dependent on the education we have received, and thus the development of the educational sector may have foundational connections with the capability-based approach.

Another challenge is that activists' advocacy may lead to the so-called 'Rhetoric Selection' of statistical information whereby "*feelings and facts are merged in reaching for the audience's empathy and wallets*" (Rosling et al., 2005). In other words, there is no guarantee that a narrative would not precede the data. On the contrary, isn't this always the case? The *separability* versus *non-separability* of feelings and facts is one of the distinctive features of normal versus post-normal science (Funtowicz and Ravetz, 1990). Perversely, some practitioners condemn CIs, not because of their analytic properties but because they identify them with an undesired narrative. Thus Martin Wolf (2005), in his criticism of the localism of anti-globals, notes:

Perhaps to disguise the failure of such closed communities, measurements of successful performance would no longer be based on "traditional economic growth figures like GDP and GNP, but rather on more subjective social and environmental characteristics"

(Wolf's own quotation is from Cavanaugh et al.'s "Alternatives to Economic Globalisation", 2004).

Nor are we arguing that the best narratives (in the sense of 'fitness') are those based on measurements. The ghost of the Polish plumber was apparently an apt protagonist in the French *Non* campaign. Yet a narrative could have been built on available data to negotiate with voters on the impact of globalisation and the role of EU enlargement in it.

More to the point, the (missing) discourse on enlargement could not have been developed without data, and a debate on those. Whether this would have saved the Constitution is of course another story altogether. At times negotiation is clogged by too much conflicting scientific information (Sarewitz, 2004). This is surely not what happened on the Lisbon agenda in Europe.

NOTES

[1] In the EC Lisbon related literature the issue of legacy toward future generation is often raised when discussing environmental issues, in the framework of sustainability. Inter-generational inequalities linked to the possible non-sustainability e.g. of member states deficits is mentioned infrequently.

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