

Sensitivity Auditing

Andrea Saltelli,
November 28 2022

JRC course on sensitivity analysis,
Brussels, November 28-29



BARCELONA
SCHOOL OF
MANAGEMENT



First part – 28 Nov

9:30- 10.00 Round table with participants

10:00 -10:30 Welcome, introduction, the use of evidence in the Better Regulation context, models, models in impact assessment (Paul)

10:30 – 11:10 Models, uncertainty and model quality assurance (**Andrea, 40m**)

11:10-11:45 Uncertainty analysis & Sensitivity analysis concept and brief history, Basics of statistics, Monte Carlo method (Stefano)

11.45-12 (break 15 mins)

12:00-12:30 Uncertainty and sensitivity analysis in impact assessment (**Andrea 30m**: stress on OAT vs GSA)

12:30-13:15 Steps of a sensitivity analysis I part (Rossana: OAT example/scatterplot/introduction to SI)

Closure All

Second part – 29 Nov am

9:15-9:45 Steps of a sensitivity analysis II part: variance-based and Sobol' method (Stefano)

9:45-10:20 Use of Siml@b tool for global sensitivity analysis (Rossana)

10:20-10:50 Examples of sensitivity analysis results (**Andrea 30m**)

10:50-11.05 (break 15 mins)

11.05 11.30 Examples of sensitivity analysis results (Stefano)

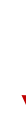
11:30 -12:30 Sensitivity Auditing (Andrea 60m)

Conclusions (with Paul) 12:30 – 12:45



HOME ABOUT ME PUBLICATIONS NEWS & VIDEOS RESOURCES

Where to find this talk:



CAETERIS ARE NEVER PARIBUS

Mastodon Toots by @AndreaSaltelli



AndreaSaltelli

2022/11/25 18:27

Fantastic! Thanks to a clever web-expert I now have a Mastodon window on my own web site!



papers.ssrn.com/sol3/papers.cf

[Boost]:0 [Favourite]:0



AndreaSaltelli

2022/11/21 15:47

@lueby42

Welcome to this world.

[Boost]:0 [Favourite]:1

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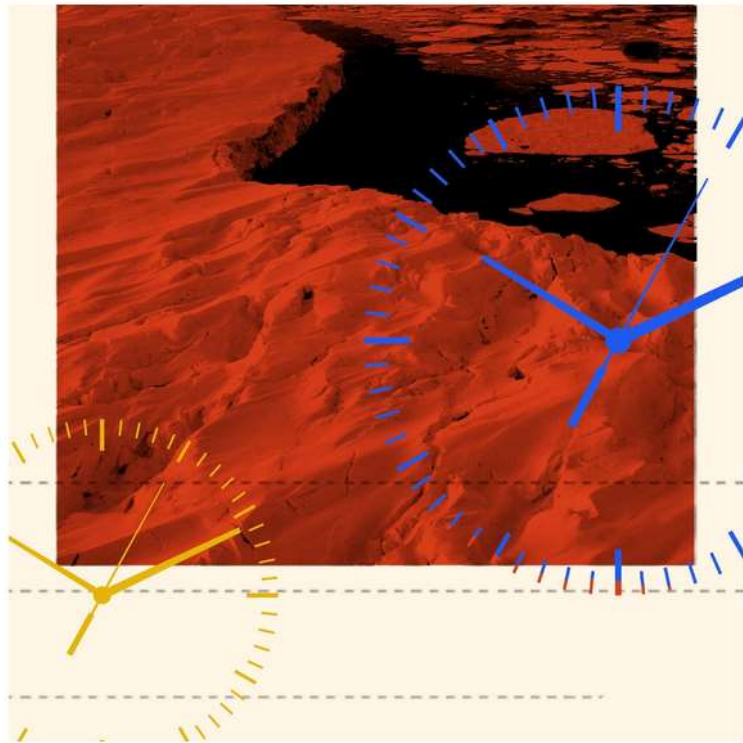


AndreaSaltelli

Do we live immersed in
fantastic numbers?

‘The Most Important Number You’ve Never Heard Of’

Sept. 17, 2021



“social cost of carbon:

=\$56 a ton on average at a 3 percent discount rate

=\$171 a ton on average at a 2 percent discount rate”

The New York Times

The Social Cost of Carbon: Advances in Long-Term Probabilistic Projections of Population, GDP, Emissions, and Discount Rates

Kevin Rennert, Brian C. Prest, William A. Pizer, Richard G. Newell, David Anthoff,
Cora Kingdon, Lisa Rennels, Roger Cooke, Adrian E. Raftery, Hana Ševčíková,
and Frank Errickson

Working Paper 21-28
October 2021

Averaged till year 2300

Feeds into policy design

We have perhaps reached a complex epistemic state, where on the one hand ‘everybody knows’ that some numbers are pseudo-precise and that numbers can be gamed, while the game works only because most people don’t know about it



Jerome R. Ravetz

Sensitivity auditing

EC impact assessment guidelines: sensitivity analysis & auditing



Better Regulation
TOOLBOX

November 2021

European Commission. November 2021. “Better Regulation: Guidelines and Toolbox.”

https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en

Sensitivity auditing in the EC Guidelines (p. 563)

“Sensitivity auditing is a wider consideration of the effect of all types of uncertainty, including structural assumptions embedded in the model, and subjective decisions taken in the framing of the problem.”



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Sensitivity auditing in the EC Guidelines (p. 563)

“In general, sensitivity auditing stresses the idea of clearly communicating the extent to which particular models can be used to support policy decisions and their results can be trusted, taking into account as much as possible all forms of potential uncertainty, ...”



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Sensitivity auditing in the EC Guidelines (p. 563)

“... and to anticipate criticism by third parties. In particular, one should avoid giving the impression of false confidence by ‘quantification at all costs’.”



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Sensitivity auditing in the EC Guidelines (p. 563)

“In some cases there is simply not enough data, or the process is too complex, to give a meaningful quantitative prediction.”



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What do I make of your latinorum? Sensitivity auditing of mathematical modelling

Saltelli, A., Guimarães Pereira, Â.,
Van der Sluijs, J.P. and Funtowicz, S.

The rules of sensitivity auditing

1. Check against rhetorical use of mathematical modelling;
2. Adopt an “assumption hunting” attitude; focus on unearthing possibly implicit assumptions;
3. Check if uncertainty been instrumentally inflated or deflated.

4. Find sensitive assumptions before these find you; do your SA before publishing;
5. Aim for transparency; Show all the data;
6. Do the right sums, not just the sums right;
7. Perform a proper global sensitivity analysis.

Do the right sums, not
just the sums right;

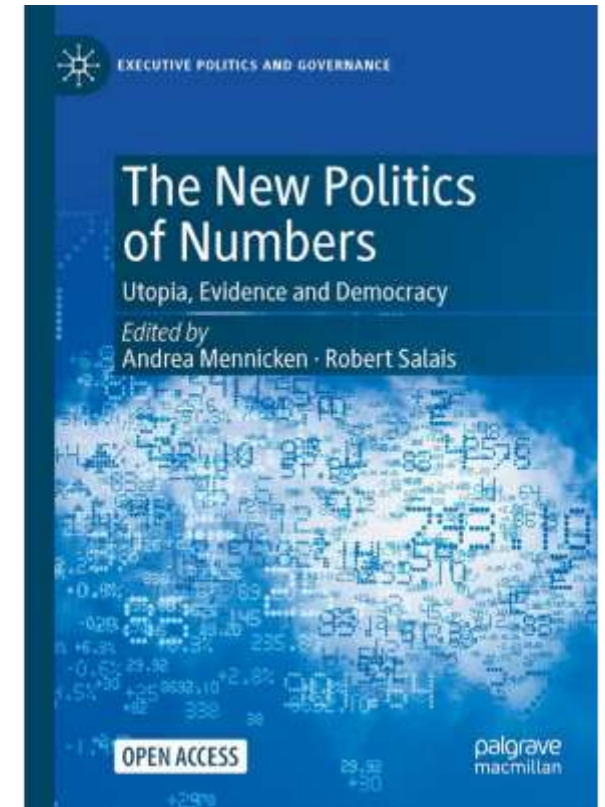
Meaning? 

Since the technique is never neutral a technical proof of quality is illusory without a parallel investigation of normative quality

Technical Quality

Normative quality

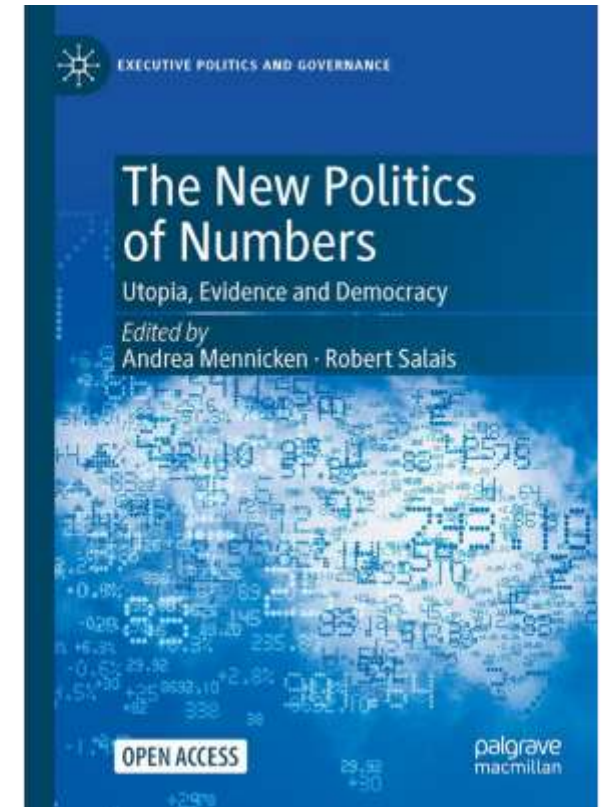
How the numbers of neoliberalism (New Public Management) constitute a regime of a-democracy; the example of indicators of employment



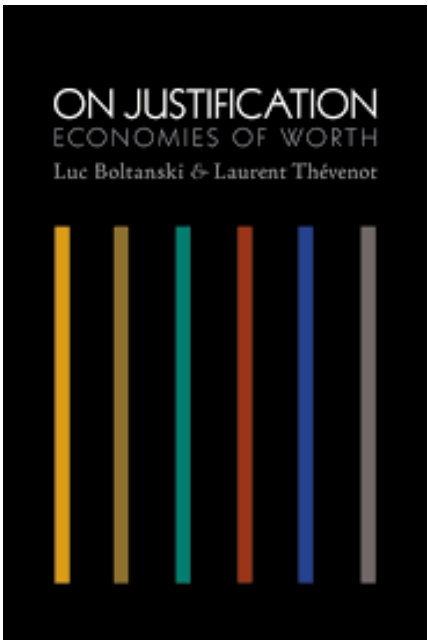
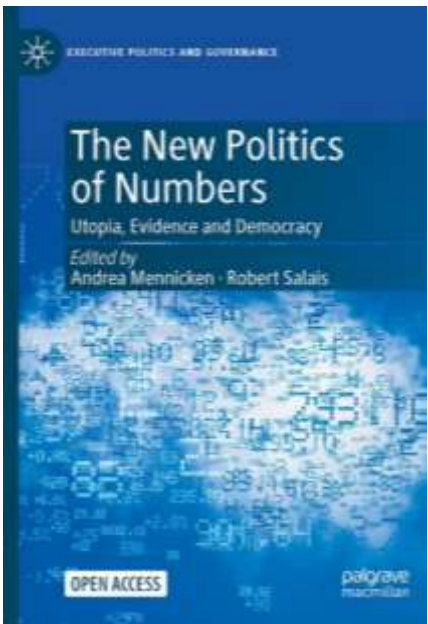
Salais, R. (2022). “La donnée n’est pas un donné”: Statistics, Quantification and Democratic Choice. In *The New Politics of Numbers: Utopia, Evidence and Democracy*, Andrea Mennicken and Robert Salais, Palgrave Macmillan, pp. 379–415.



Normative quality ...
yes but which norms?



Thévenot, L. (2022). A New Calculable Global World in the Making: Governing Through Transnational Certification Standards. In *The new politics of numbers*, Andrea Mennicken and Robert Salais, Palgrave Macmillan, pp. 197–252.



A New Calculable Global World
in the Making: Governing Through
Transnational Certification Standards

Laurent Thévenot

critical public debates between
conceptions of the common good



individual consumers' choices
between certified market goods



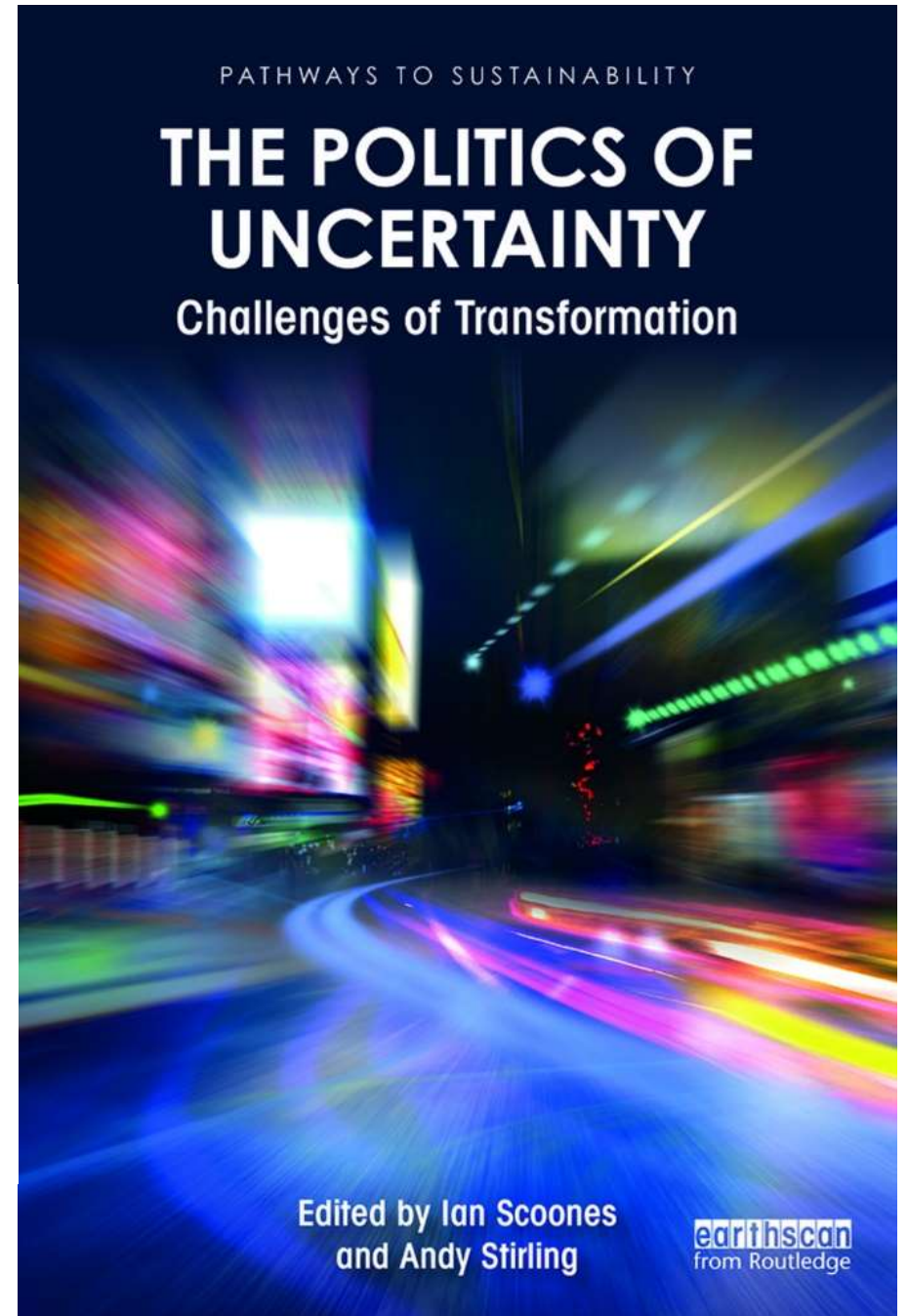
On reductionism

4

THE UNRAVELLING OF TECHNOCRATIC ORTHODOXY?

Contemporary knowledge politics
in technology regulation

Patrick van Zwanenberg



Why reductionism in the practice of EU institutions?

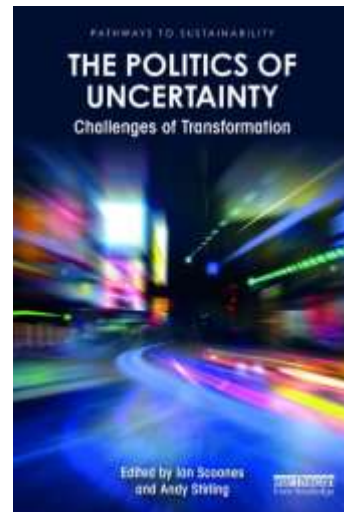
- the single market needs a centralized, standardized, risk assessment
- pro-industry (e.g. biotech) agenda
- fear of opening the road to endless deconstruction (van Zwanenberg 2020)

4

THE UNRAVELLING OF TECHNOCRATIC ORTHODOXY?

Contemporary knowledge politics
in technology regulation

Patrick van Zwanenberg

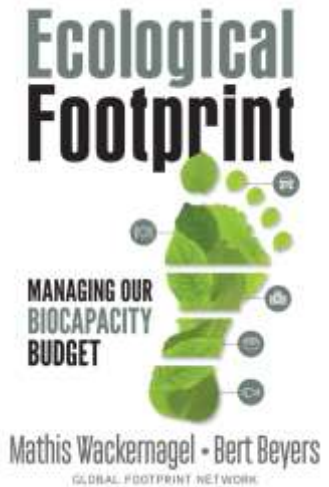


Applications of sensitivity auditing to food security, nutrition and public health, hydrology, OECD PISA tests, ecological footprint



Futures

Volume 144, December 2022, 103041



Unpacking the modelling process via sensitivity auditing

Samuele Lo Piano ^a  , Razi Sheikholeslami ^b, Arnald Puy ^{c, d, e}, Andrea Saltelli ^f



Hybrid quantitative / qualitative and ‘transdisciplinary’ methods
(such as sensitivity auditing) that:

“Recognising the ever-present importance of alternative categories and relations, they show that all ‘quantitative problems’ are always also fundamentally qualitative at root”
(Andy Stirling, forthcoming)

Andy Stirling, Mind the Unknowns: Acknowledge Ignorance, in Saltelli, A., and M. Di Fiore, eds. 2023. Views on Responsible Modelling, forthcoming, Oxford University Press.

“...excessive reliance on a standard neoclassic economic toolbox”

→ alternative economic schools

- non-Ricardian economics
- feminist-economics
- bioeconomics
- qualitative-quantitative methods from post-normal science

Case studies in the domains of energy, water, health and climate

A New Gaze for Impact Assessment Practices in the European Union

31 Pages • Posted: 8 Jul 2022

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The End