International Microsimulation Association

EDITORIAL

Editorial

Matteo G Richiardi[1]*

[1]University of Essex, Colchester, United Kingdom

It is with great honour and pleasure that I am introducing this special issue of the International Journal of Microsimulation, devoted to the work of Gunnar Eliasson around the MOSES (MOdel of the Swedish Economic System) microsimulation architecture.

Arguably, dynamic microsimulation has three parents: Guy Orcutt and Barbara Bergmann in the U.S., and Gunnar Eliasson in Europe. In the late 1950s, Guy Orcutt had the original idea of using representative distributions of individuals, households, or firms as inputs for large-scale computed models - "a new type of modelling approach" that would emphasise their heterogeneous characteristics and decision making, allowing to represent and analyse not only economy-wide averages, but the entire distribution of relevant outcomes (***Orcutt, 1957***; see also ***Watts, 1991***). Working with a team of doctoral students and programmers at the University of Wisconsin - Madison, he developed his first "microanalytical model" (***Orcutt et al., 1961***), later morphing into the DYNASIM model he developed at the Urban Institute and Yale (***Orcutt et al., 1976***). At the same time, Barbara Bergmann at the University of Maryland was working on her "U.S. Transactions" model (***Bergmann, 1973***). Bergmann is most renown for her work as a pioneering feminist economist, but her contributions were also foundational for the emerging field of microsimulation modelling (***Olson, 2007***). Meanwhile, in Stockholm Gunnar Eliasson – then Chief Economist at the Federation of Swedish Industries – was in talks with IBM to develop a computer model of the Swedish economy. It was Kenneth Arrow who put him in contact with Bergmann and Orcutt (***Eliasson, 2018***), and he quickly realised that it was Bergmann's model that was closer to the specification he had in mind, namely a complete model of the economy encompassing not only individuals and households, but also firms. The model was thoroughly described in a lengthy 1976 paper (***Eliasson, 1976***), with results being published as ***Eliasson (1977)***. For their nature emphasising interactions between economic agents, Bergmann's and Eliasson's models can rightly be considered as *ante litteram* data-driven macro agent-based models (***Richiardi, 2014***; ***Richiardi et al., 2024***). The pioneering role of Orcutt, Bergmann and Eliasson can be appreciated in a joint edited volume (***Bergmann et al., 1977***). 50 years on, the DYNASIM model is still developed at the Urban Institute, while the MOSES architecture, after having proved fruitful for decades, is dormant but ready to be revived (the pseudo-code for the model is made available for download as part of this special issue).

Aside some prestigious hits however (Orcutt publishing in the *Review of Economics and Statistics*, Bergmann in *Econometrica*, Eliasson in the *American Economic Review*), much of this early work is documented only in reports, working papers, technical notes, or book chapters that are increasingly difficult to access. Such was the norm at the time, with much less emphasis than today on journal publications. One aim of this special issue is therefore to save this important material from fading away, and publish it in journal format for the first time. The fact that Gunnar himself managed to curate the special issue, selecting the articles, abridging them wherever appropriate, adding clarifications here and there, and writing an introductory article where he reflects on his 50-year experience, summarises the main contributions of his modelling effort and places MOSES in the context of the history of economic ideas, is outright exceptional. We are extremely grateful to him for this effort, which we are proud and honoured to host on the pages of the journal.

An outline of the special issue is presented in ***Table 1***. The first article is novel and contains, as already mentioned, Gunnar's own appreciation of the MOSES experience (the pseudo-code for the last version of the model is attached as additional material to this article). This is followed by 9 other articles, only some of which were originally accessible, either in working paper format or as book

***For correspondence:**
matteo.richiardi@essex.ac.uk

chapters.[1] The first of these articles (***Eliasson, 1976***) is an abridged version of the original model description paper. The subsequent articles describe applications and developments of the model.

Conflict of Interest

No competing interests reported.

References

Ballot G, Eliasson G, Taymaz E. 2006. The Role Of Commercialization Competence In Endogenous Economic Growth. Working Papers ERMES 0608, ERMES, University Paris 2, Paris.

Bergmann BR. 1973. Combining Microsimulation and Regression: A "Prepared" Regression of Poverty Incidence on Unemployment and Growth. *Econometrica* **41**: 955–963. DOI: https://doi.org/10.2307/1913816

Bergmann BR, Eliasson G, Orcutt GH (Eds). 1977. Micro simulation - models, methods, and applications. Proceedings of the Symposium on Micro Simulation Methods, Stockholm, September 19-22, The Research Institute of Industrial Economics (IUI), Stockholm. .

Carlsson B, Eliasson G, Taymaz E. 1997. Micro-Macro Simulation of Technological Systems: Economic Effects of Spillovers (Economics of Science, Technology and Innovation). Carlsson B (Ed). *Technological Systems and Industrial Dynamics, Ch. 9*. Vol. 10 Springer, Boston. p. 255–278.

Eliasson G. 1976. A Micro-Macro Interactive Simulation Model of the Swedish Economy. IUI Working Paper No.7.The Research Institute of Industrial Economics (IUI), Stockholm.

Eliasson G. 1977. Competition and Market Processes in a Simulation Model of the Swedish Economy. *American Economic Review* **67**: 277–281.

Eliasson G. 1980. Experiments With Fiscal Policy Parameters on a Micro to Macro Model of The Swedish Economy. Haveman Robert, Hollenbeck Kevin (Eds). *Microeconomic Simulation Models for Public Policy Analysis*. Academic Press, New York. DOI: https://doi.org/10.1016/B978-0-12-333202-8.50013-2

Eliasson G, Lindberg T. 1981. Allocation and Growth Effects of Corporate Income Taxes-Some Experiments in Quantification on a Micro-to-Macro Model of the Swedish Economy. Eliasson G, Södersten J (Eds). Business Taxation, Finance and Firm Behavior, IUI Conference Reports, The Research Institute of Industrial Economics (IUI), Stockholm. .

Table 1. Outline of the special issue.

	Title	Originally published as
1	Modelling the Experimentally Organized Economy	
2	A Micro-Macro Interactive Simulation Model of the Swedish Economy	Eliasson (1976)
3	Experiments With Fiscal Policy Parameters on a Micro to Macro Model of The Swedish Economy	Eliasson (1980)
4	Allocation and Growth Effects of Corporate Income Taxes-Some Experiments in Quantification on a Micro-to-Macro Model of the Swedish Economy	Eliasson and Lindberg (1981)
5	The limits of Policymaking - An analysis of the consequences of boundedly rational government using the Swedish Micro-to-Macro model (MOSES)	Eliasson and Taymaz (1992)
6	Endogenous Economic Growth Through Selection	Eliasson (1996)
7	Micro-Macro Simulation of Technological Systems: Economic Effects of Spillovers	Carlsson et al. (1997)
8	Modelling Financial Derivatives Markets in a Firm Based Evolutionary Macro Model (MOSES) On the market integration of computing, communications, and financial services	Eliasson and Taymaz (2001)
9	Firm Turnover and the Rate of Macro Economic Growth: Simulating the Macroeconomic Effects of Schumpeterian Creative Destruction	Eliasson et al. (2005)
10	The Role of Commercialization Competence in Endogenous Economic Growth	Ballot et al. (2006)

Eliasson G, Taymaz E. 1992. The Limits of Policy Making: An Analysis of the Consequences of Boundedly Rational Government Using the Swedish Micro-to-Macro Model (MOSES). IUI Working Paper No.333. The Research Institute of Industrial Economics (IUI), Stockholm.

Eliasson G. 1996. Endogenous Economic Growth Through Selection (Contributions to Economic Analysis). HardingA (Ed). *Microsimulation and Public Policy: Selected Papers from the IARIW Special Conference on Microsimulation and Public Policy*. Vol. **232** Elsevier, Amsterdam/New York/Oxford. p. 405–419.

Eliasson G, Taymaz E. 2001. Modeling financial derivatives in a firm based evolutionary macro model (MOSES) — the integration of computing, communications and financial services. [KTH TRITA series, KTH, Stockholm].

Eliasson G, Johansson D, Taymaz E. 2005. Firm Turnover and the Rate of Macroeconomic Growth - Simulating the Macroeconomic Effects of Schumpeterian Creative Destruction. Eliasson G (Ed). *The Birth, the Life and the Death of Firms: The Role of Entrepreneurship, Creative Destruction and Conservative Institutions in a Growing and Experimentally Organized Economy*. The Ratio Institute, Stockholm. p. 305–356.

Eliasson G. 2018. Why Complex, Data Demanding and Difficult to Estimate Agent Based Models? Lessons from a Decades Long Research Program. *International Journal of Microsimulation* **11**: 4–60. DOI: https://doi.org/10.34196/ijm.00173

Olson PI. 2007. On the Contributions of Barbara Bergmann to Economics. *Review of Political Economy* **19**: 475–496. DOI: https://doi.org/10.1080/09538250701622303

Orcutt GH. 1957. A New Type of Socio-Economic System. *The Review of Economics and Statistics* **39**: 116–123. DOI: https://doi.org/10.2307/1928528

Orcutt GH, Greenberger M, Korbel J, Rivlin AM. 1961. Microanalysis of Socioeconomic Systems. A Simulation Study. Harper & Brothers, New York.

Orcutt GH, Caldwell S, Wertheimer R. 1976. Policy Exploration through Microanalytic Simulation. Urban Institute, Washington, D.C.

Richiardi M. 2014. The missing link: AB models and dynamic microsimulation (Lecture Notes in Economics and Mathematical Systems). Leitner S, Wall F (Eds). *Artificial Economics and Self Organization. Springer*. Vol. 669 Springer. DOI: https://doi.org/10.1007/978-3-319-00912-4_1

Richiardi M, Ven de Ven J, Bronka P. 2024. Back to the future: Agent-based modelling and dynamic microsimulation". CeMPA WP 8/23. Centre for Microsimulation and Policy Analysis, University of Essex. This article will be a contributed chapter to the SFI edited volume. The Economy as a Complex Evolving System, Part IV.

Watts HW. 1991. Distinguished Fellow: An Appreciation of Guy Orcutt. *Journal of Economic Perspectives* **5**: 171–179. DOI: https://doi.org/10.1257/jep.5.1.171