Pós-Graduação em Modelagem de Sistemas Complexos

Modelos Econômicos Baseados em Agentes (SCX-5015) - 2020

Docente Responsável: Prof. Dr. Carlos de Brito Pereira

Apresentação

O objetivo da disciplina neste semestre é discutir como os avanços na área de modelagem de sistemas complexos podem ser utilizados em questões de teoria econômica, com atenção especial para a técnica de modelagem por agentes. Não há implementação de programas.

Avaliação

A avaliação é constituída pela apresentação de um seminário (*) sobre os artigos indicados na bibliografia (peso 0,3) e pela entrega de um texto com proposta de alteração em ao menos um dos modelos apresentados nos seminários (peso 0,7).

(*) O número de seminários depende da quantidade de alunos.

Instruções para os seminários

As instruções estão em documento postado no google drive da disciplina.

Participação em sala de aula

A participação dos alunos é incentivada nesta disciplina. Faça perguntas, sugestões e comentários durante as aulas. Academia é lugar de debate, desde que civilizado.

Calendário de Atividades

DATA	AULA	TEMA	PASTA
14/08/20	Aula 01	Apresentação do Curso Economia & Econofísica / Protocolos para ABM	1
21/08/20	Aula 02	Complexidade na História do Pensamento Econômico	2
28/08/20	Aula 03	Modelos baseados em agentes em Economia: questões / Seminário	3
04/09/20	Aula 04	Rigor metodológico em modelos baseados em agentes / Seminário	4
11/09/20	Aula 05	Teoria econômica, complexidade e modelos baseados em agentes / Seminário	5
18/09/20	Aula 06	Brian Arthur: Feedbacks positivos e economias de escala / Seminário	6
25/09/20	Aula 07	Alan Kirman: Contra o agente representativo / Seminário	7
02/10/20	Aula 08	Simulação e o fenômeno da emergência / Seminário	8
09/10/20	Aula 09	Modelos baseados em agentes nas ciências sociais / Seminário	9
16/10/20	Aula 10	KISS: Keep it simple, stupid! / Seminário	10
23/10/20	Aula 11	Aula expositiva / Seminário	Artigos para Seminários
30/10/20	Aula 12	Aula expositiva /Seminário	Artigos para Seminários
06/11/20	Aula 13	Seminários	Artigos para Seminários
13/11/20	Aula 14	Discussão dos trabalhos	Artigos para Seminários
20/11/20	Aula 15	Discussão dos trabalhos	Artigos para Seminários
20/12/2020		**ENTREGA DOS TRABALHOS**	

Textos para as aulas:

Aula 01:

Parte 1: "Economia & Econofísica"

Ball, P. (2006). Culture Crash. *Nature*, *441*(8), 686–688.

Gallegati, M., Keen, S., Lux, T., & Ormerod, P. (2006). Worrying trends in econophysics. *Physica A: Statistical Mechanics and Its Applications*, *370*(1), 1–6. http://doi.org/10.1016/j.physa.2006.04.029

McCauley, J. L. (2006). Response to "Worrying Trends in Econophysics." *Physica A: Statistical Mechanics and Its Applications*, *371*(2), 601–609. http://doi.org/10.1016/j.physa.2006.05.043

Schinckus, C. (2010a). Econophysics and economics: sister disciplines? *American Journal of Physics*, *78*(4), 325–327.

Parte 2: "Protocolos para modelos baseados em agentes"

Grimm, V., Berger, U., Bastiansen, F., Eliassen, S., Ginot, V., Giske, J., … DeAngelis, D. L. (2006). A standard protocol for describing individual-based and agent-based models. *Ecological Modelling*, *198*(1-2), 115–126. http://doi.org/10.1016/j.ecolmodel.2006.04.023

Richiardi, M. G. (2012). Agent-based computational economics: a short introduction. *The Knowledge Engineering Review*, *27*(02), 137–149. http://doi.org/10.1017/S0269888912000100

Aula 02: "Complexidade na História do Pensamento Econômico"

COLANDER, David (2000): "A Thumbnail Sketch Of The History of Thought From A Complexity Perspective".

JOVANOVIC, Franck & SCHINCKUS, Christopher (2013): "The Emergence of Econophysics: A New Approach in Modern Financial Theory". In History of Political Economy 45(3): 443-74

SCHINCKUS, Christopher (2010): "Is econophysics a new discipline? The neopositivism argument'. In Physica A 389 (2010): 3814-21

Aula 03: "Modelos Baseados em Agentes em Economia: questões"

BARGIGLI & TEDESCHI (2013): "Major trends in agent based economics". In Journal of Economic Interaction and Coordination 8:208-217.

FARMER, J. Doyne & FOLEY, Duncan (2009): "The economy needs agent basedmodelling". In Nature 460(6):685-686.

LILLO, Fabrizio (2008): "Econophysics and the Challenge of Efficiency ". In Complexity14(3): 39-54.Ball, P. (2006). Culture Crash. *Nature*, *441*(8), 686–688.

Aula 04: "Rigor Metodológico em Modelos Baseados em Agentes"

RAND, W. & RUST, R.T. (2011): "Agent-Based Modeling in Marketing: Guidelines for rigor". In International Journal of Research in Marketing 28(2011): 181-193.

Aula 05: "Teoria econômica, complexidade e modelos baseados em agentes"

ARTHUR, W.B. (2013): "Complexity economics: a different framework for economic thought". SFI WORKING PAPER: 201304012 (Santa Fé Institute).

FOSTER, J. & METCALFE, J.S. (2012): "Economic emergence: An evolutionary economic perspective". In Journal of Economic Behavior & Organization 82 (2012): 420-432.

GALLEGATI, M. (2012): Reconstructing Economics: Agent Based Models andComplexity. Working Paper. DiSES, Università Politecnica delle Marche, Ancona.

Aula 06: "Brian Arthur: Feedbacks positivos e economias de escala"

ARTHUR, W. Brian (1990): "Positive Feedbacks in Economics". In Scientific American 262 (February): 92-99.

ARTHUR, W. Brian (1999): "Complexity and Economics". In Science 284 (April): 207-209.

Aula 07: "Alan Kirman: Contra o agente representativo"

KIRMAN, Alan P. (1989): "The Intrinsic Limits of Modern Economic Theory: The Emperor has No Clothes". In The Economic Journal 99 (395): 126-139 [Supplement: Conference Papers].

KIRMAN, Alan P. (1992): "Whom or What Does the Representative Individual Represent? " In The Journal of Economic Perspectives: 6(2): 117-136.

KIRMAN, Alan P. (2006): "Heterogeneity in economics". In Journal of Economic Interaction and Coordination (2006) 1: 89–117.

Textos suplementares:

PEREIRA, Carlos de Brito (2000): "As Faces de Janus: Sobre a possibilidade de mensuração do Efeito Veblen". Dissertação de Mestrado apresentada à Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo. São Paulo, 2000 (mímeo).

PEREIRA, Carlos de Brito (2004): "O Marketing do Lugarzinho: uma aplicação exploratória da técnica de índice de preços hedônicos a jovens consumidores de restaurantes na cidade de São Paulo". Tese de Doutorado apresentada à Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo. São Paulo, 2004 (mímeo).

Aula 08: "Simulação e o fenômeno da emergência"

HARPER, David A. & LEWIS, Paul (2012): "New persptectives on emergence in economics" [Editorial]. In Journal of Economic Behavior & Organization 82(2012): 329-337.

SHUBIK, Martins (1996): "Simulations, Models and Simplicity". In Complexity 2(1): 60.

Texto Suplementar:

HIDALGO, César A. & HAUSMANN, Ricardo (2009): "The building blocks of economic complex

Aula 09: "Modelos baseados em agentes nas ciências sociais"

MARKS, Robert E. (2012): "Analysis and synthesis: multi-agent systems in the social sciences". In The Knowledge Engineering Review 27(2): 123–136.

PAGE, Scott E. (2012): "Aggregation in agent-based models of economies". In The Knowledge Engineering Review 27(2): 151–162.Ball, P. (2006). Culture Crash. *Nature*, *441*(8), 686–688.

Aula 10: "KISS: Keep It Simple, Stupid!"

Sun, Zhanli, Iris Lorscheid, James D. Millington, Steffen Lauf, Nicholas R. Magliocca, Jürgen Groeneveld, Stefano Balbi, et al. (2016): "Simple or Complicated Agent-Based Models? A Complicated Issue". *Environmental Modelling & Software* 86 (dezembro de 2016): 56–67. https://doi.org/10.1016/j.envsoft.2016.09.006.

Textos para os seminários:

Antunes, L., Balsa, J., Urbano, P., Moniz, L., & Roseta-Palma, C. (2005). Tax compliance in a simulated heterogeneous multi-agent society. In *International Workshop on Multi-Agent Systems and Agent-Based Simulation* (pp. 147–161). Springer. Retrieved from http://link.springer.com/10.1007%2F11734680_11

Bloomquist, K. M. (2004). Multi-agent based simulation of the deterrent effects of taxpayer audits. In *Proceedings. Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association* (Vol. 97, pp. 159–173). JSTOR. Retrieved from http://www.jstor.org/stable/41954834

Calisti, Roberto, Primo Proietti, e Andrea Marchini. 2019. "Promoting Sustainable Food Consumption: An Agent-Based Model About Outcomes of Small Shop Openings". *Journal of Artificial Societies and Social Simulation* 22 (1). https://doi.org/10.18564/jasss.3901.

Caram, L. F., Caiafa, C. F., Proto, A. N., & Ausloos, M. (2010). Dynamic peer-to-peer competition. *Physica A: Statistical Mechanics and Its Applications*, *389*(13), 2628–2636. http://doi.org/10.1016/j.physa.2010.02.032

Chu, Zhuang, Biao Yang, Chang Yong Ha, e Kwangwon Ahn. 2018. "Modeling GDP Fluctuations with Agent-Based Model". *Physica A: Statistical Mechanics and Its Applications* 503 (agosto): 572–81. https://doi.org/10.1016/j.physa.2018.02.019.

D'Orazio, Paola, e Gianfranco Giulioni. 2017. "From Micro Behaviors to Macro Dynamics: An Agent-Based Economic Model with Consumer Credit". *Journal of Artificial Societies and Social Simulation* 20 (1). https://doi.org/10.18564/jasss.3260.

Dabirian, Sh., M. Khanzadi, e M. Moussazadeh. 2016. "Predicting Labor Costs in Construction Projects Using Agent-Based Modeling and Simulation". *Scientia Iranica* 23 (1): 91–101. https://doi.org/10.24200/sci.2016.2100.

Delli Gatti, D., Gallegati, M., Greenwald, B. C., Russo, A., & Stiglitz, J. E. (2009). Business fluctuations and bankruptcy avalanches in an evolving network economy. *Journal of Economic Interaction and Coordination*, *4*(2), 195–212. http://doi.org/10.1007/s11403-009-0054-x

Fan, Rui, Ke Xu, e Jichang Zhao. 2018. "An Agent-Based Model for Emotion Contagion and Competition in Online Social Media". *Physica A: Statistical Mechanics and Its Applications* 495 (abril): 245–59. https://doi.org/10.1016/j.physa.2017.12.086.

Jiang, Guoyin, Shan Liu, Wenping Liu, e Yan Xu. 2018. "Agent-Based Modeling and Simulation of the Decision Behaviors of e-Retailers". *Industrial Management & Data Systems* 118 (5): 1094–1113. https://doi.org/10.1108/IMDS-07-2017-0321.

Lengnick, M. (2013). Agent-based macroeconomics: A baseline model. *Journal of Economic Behavior & Organization*, *86*, 102–120. http://doi.org/10.1016/j.jebo.2012.12.021

Li, H., & Gao, Y. (2008). A GDP fluctuation model based on interacting firms. *Physica A: Statistical Mechanics and Its Applications*, *387*(21), 5225–5230. http://doi.org/10.1016/j.physa.2008.05.016

McPhee-Knowles, Sara. 2014. "What's On the Menu: Assessing Manufactured Risk in Restaurant Inspection Systems Using Agent-Based Models". *Journal on Policy and Complex Systems* 1 (2): 19. https://doi.org/10.18278/jpcs.1.2.7.

Moncada, J.A., J.A. Verstegen, J.A. Posada, M. Junginger, Z. Lukszo, A. Faaij, e M. Weijnen. 2018. "Exploring Policy Options to Spur the Expansion of Ethanol Production and Consumption in Brazil: An Agent-Based Modeling Approach". *Energy Policy* 123 (dezembro): 619–41. https://doi.org/10.1016/j.enpol.2018.09.015.

Naqvi, A. A., & Rehm, M. (2014). A multi-agent model of a low income economy: simulating the distributional effects of natural disasters. *Journal of Economic Interaction and Coordination*, *9*(2), 275–309. http://doi.org/10.1007/s11403-014-0137-1

Paothong, A., & Ladde, G. S. (2014). Agent-based modeling simulation under local network externality. *Journal of Economic Interaction and Coordination*, *9*(1), 1–26. http://doi.org/10.1007/s11403-013-0110-4

Rutkauskas, A. V., & Ramanauskas, T. (2009). Building an artificial stock market populated by reinforcement-learning agents. *Journal of Business Economics and Management*, *10*(4), 329–341. http://doi.org/10.3846/1611-1699.2009.10.329-341

Vallejos, Hunter A., James J. Nutaro, e Kalyan S. Perumalla. 2018. "An Agent-Based Model of the Observed Distribution of Wealth in the United States". *Journal of Economic Interaction and Coordination* 13 (3): 641–56. https://doi.org/10.1007/s11403-017-0200-9.

Veen, R.A.C. van der, K.H. Kisjes, e I. Nikolic. 2017. "Exploring Policy Impacts for Servicising in Product-Based Markets: A Generic Agent-Based Model". *Journal of Cleaner Production* 145 (março): 1–13. https://doi.org/10.1016/j.jclepro.2017.01.016.

Wang, Y., Li, Y., & Liu, M. (2007). Impact of asymmetric information on market evolution. *Physica A: Statistical Mechanics and Its Applications*, *373*, 665–671. http://doi.org/10.1016/j.physa.2006.05.037

Westerhoff, F. (2010). An agent-based macroeconomic model with interacting firms, socio-economic opinion formation and optimistic/pessimistic sales expectations. *New Journal of Physics*, *12*(7), 075035. http://doi.org/10.1088/1367-2630/12/7/075035

Zaklan, G., Westerhoff, F., & Stauffer, D. (2009). Analysing tax evasion dynamics via the Ising model. *Journal of Economic Interaction and Coordination*, *4*(1), 1–14. http://doi.org/10.1007/s11403-008-0043-5

Outros Textos Interessantes sobre Modelagem Baseada em Agentes:

Abar, Sameera, Georgios K. Theodoropoulos, Pierre Lemarinier, e Gregory M.P. O'Hare. 2017. "Agent Based Modelling and Simulation Tools: A Review of the State-of-Art Software". *Computer Science Review* 24 (maio): 13–33. https://doi.org/10.1016/j.cosrev.2017.03.001.

Bankes, Steven, Robert Lempert, e Steven Popper. 2002. "Making Computational Social Science Effective: Epistemology, Methodology, and Technology". *Social Science Computer Review* 20 (4): 377–88. https://doi.org/10.1177/089443902237317.

Casini, Lorenzo, e Gianluca Manzo. [s.d.]. "Agent-Based Models and Causality : A Methodological Appraisal", 81.

Müller, Birgit, Stefano Balbi, Carsten M. Buchmann, Luís de Sousa, Gunnar Dressler, Jürgen Groeneveld, Christian J. Klassert, et al. 2014. "Standardised and Transparent Model Descriptions for Agent-Based Models: Current Status and Prospects". *Environmental Modelling & Software* 55 (maio): 156–63. https://doi.org/10.1016/j.envsoft.2014.01.029.

Müller, Birgit, Friedrich Bohn, Gunnar Dreßler, Jürgen Groeneveld, Christian Klassert, Romina Martin, Maja Schlüter, Jule Schulze, Hanna Weise, e Nina Schwarz. 2013. "Describing Human Decisions in Agent-Based Models – ODD + D, an Extension of the ODD Protocol". *Environmental Modelling & Software* 48 (outubro): 37–48. https://doi.org/10.1016/j.envsoft.2013.06.003.

Niazi, Muaz, e Amir Hussain. 2011. "Agent-Based Computing from Multi-Agent Systems to Agent-Based Models: A Visual Survey". *Scientometrics* 89 (2): 479–99. https://doi.org/10.1007/s11192-011-0468-9.

Revay, Peter, e Claudio Cioffi-Revilla. 2018. "Survey of Evolutionary Computation Methods in Social Agent-Based Modeling Studies". *Journal of Computational Social Science* 1 (1): 115–46. https://doi.org/10.1007/s42001-017-0003-8.

Sabzian, Hossein, Mohammad Ali Shafia, Ali Maleki, Seyeed Mostapha Seyeed Hashemi, Ali Baghaei, e Hossein Gharib. 2019. "Theories and Practice of Agent Based Modeling: Some Practical Implications for Economic Planners". *ArXiv:1901.08932 [Econ]*, janeiro. http://arxiv.org/abs/1901.08932.

Sun, Zhanli, Iris Lorscheid, James D. Millington, Steffen Lauf, Nicholas R. Magliocca, Jürgen Groeneveld, Stefano Balbi, et al. 2016. "Simple or Complicated Agent-Based Models? A Complicated Issue". *Environmental Modelling & Software* 86 (dezembro): 56–67. https://doi.org/10.1016/j.envsoft.2016.09.006.

Outros Textos Interessantes (2):

Anufriev, M., & Hommes, C. (2012). Evolution of market heuristics. *The Knowledge Engineering Review*, *27*(02), 255–271. http://doi.org/10.1017/S0269888912000161

Arifovic, J., & Ledyard, J. (2012). Individual evolutionary learning with many agents. *The Knowledge Engineering Review*, *27*(02), 239–254. http://doi.org/10.1017/S026988891200015X

Brian, W. (1994). Inductive reasoning and bounded rationality. *Am. Econ. Rev*, *84*(2), 406–411.

Casti, J. L., & John J. (1996). Seeing the light at El Farol. *Complexity*, *1*(5), 7–10.

Chen, S.-H., Chang, C.-L., & Du, Y.-R. (2012). Agent-based economic models and econometrics. *The Knowledge Engineering Review*, *27*(02), 187–219. http://doi.org/10.1017/S0269888912000136

Dosi, G., Fagiolo, G., & Roventini, A. (2008). The microfoundations of business cycles: an evolutionary, multi-agent model. *Journal of Evolutionary Economics*, *18*(3-4), 413–432. http://doi.org/10.1007/s00191-008-0094-8

Fagiolo, G., & Roventini, A. (2012). On the scientific status of economic policy: a tale of alternative paradigms. *The Knowledge Engineering Review*, *27*(02), 163–185. http://doi.org/10.1017/S0269888912000124

Farmer, J. D., Gallegati, M., Hommes, C., Kirman, A., Ormerod, P., Cincotti, S., … Helbing, D. (2012). A complex systems approach to constructing better models for managing financial markets and the economy. *The European Physical Journal Special Topics*, *214*(1), 295–324. http://doi.org/10.1140/epjst/e2012-01696-9

Gajic, N., & Budinski-Petkovic, L. (2013). Ups and downs of economics and econophysics — Facebook forecast. *Physica A: Statistical Mechanics and Its Applications*, *392*(1), 208–214. http://doi.org/10.1016/j.physa.2012.08.018

Holland, J. H. (2006). Studying complex adaptive systems. *Journal of Systems Science and Complexity*, *19*(1), 1–8.

Keen, S. (2003). Standing on the toes of pygmies: *Physica A: Statistical Mechanics and Its Applications*, *324*(1-2), 108–116. http://doi.org/10.1016/S0378-4371(02)01851-4

Ladley, D. (2012). Zero intelligence in economics and finance. *The Knowledge Engineering Review*, *27*(02), 273–286. http://doi.org/10.1017/S0269888912000173

Luo, J. (2013). The power-of-pull of economic sectors: A complex network analysis. *Complexity*, *18*(5), 37–47. http://doi.org/10.1002/cplx.21444

Marks, R. E., & Vriend, N. J. (2012). The special issue: agent-based computational economics—overview. *The Knowledge Engineering Review*, *27*(02), 115–122. http://doi.org/10.1017/S0269888912000082

North, M. J., Macal, C. M., Aubin, J. S., Thimmapuram, P., Bragen, M., Hahn, J., … Hampton, D. (2010). Multiscale agent-based consumer market modeling. *Complexity*, NA–NA. http://doi.org/10.1002/cplx.20304

Prado, E. F. (2006). Microeconomia reducionista e microeconomia sistêmica. *Nova Economia*, *16*(2), 303–322.

Schinckus, C. (2013). Between complexity of modelling and modelling of complexity: An essay on econophysics. *Physica A: Statistical Mechanics and Its Applications*, *392*(17), 3654–3665. http://doi.org/10.1016/j.physa.2013.04.005

Schweitzer, F., Fagiolo, G., Sornette, D., Vega-Redondo, F., & White, D. R. (2009). Economic Networks: What do we know and what do we need to know? *Advances in Complex Systems*, *12*(04n05), 407–422.

Viegas, E., Takayasu, M., Miura, W., Tamura, K., Ohnishi, T., Takayasu, H., & Jensen, H. J. (2013). Ecosystems perspective on financial networks: Diagnostic tools. *Complexity*, *19*(1), 22–36. http://doi.org/10.1002/cplx.21452

Wilhite, A., & Fong, E. A. (2012). Agent-based models and hypothesis testing: an example of innovation and organizational networks. *The Knowledge Engineering Review*, *27*(02), 221–238. http://doi.org/10.1017/S0269888912000148

Livros sobre Modelos Baseados em Agentes:

BATTEN, David F. (2000): *Discovering Artificial Economics: How Agents Learn and Economies Evolve.* Westview Press. ISBN: 9780813397702.

BOERO, Riccardo; MORINI Matteo; SONESSA, Michele & TERNA, Pietro (2015): *Agent-based Models of the Economy From Theories to Applications.*

GALLEGATI, Mauro (2018): *Complex Agent-Based Models.* Springer. ISBN: 9783319938578.

GATTI, Domenico Delli; FAGIOLO, Giorgio; GALLEGATI, Mauro; RICHIARDI, Matteo & RUSSO, Alberto (2018): *Agent-Based Models in Economics: A Toolkit.* Cambridge University Press. ISBN: 9781108414999

HAMILL, Lynne & GILBERT, Nigel (2016): *Agent-Based Modelling in Economics.* Wiley, 2016. ISBN: 9781118456071.

SECHHI, Davide & NEUMANN, Martin: (2015): *Agent-Based Simulation of Organizational Behavior: New Frontiers of Social Science Research.* Palgrave Macmillan UK.

SIEGFRIED, Robert (2014): *Modeling and Simulation of Complex Systems: A Framework for Efficient Agent-Based Modeling and Simulation.* Springer Vieweg. ISBN: 9783658075286.

SILVERMAN, Eric; COURGEAU, Daniel Courgeau; FRANCK, Robert; BIJAK, Jakub; HILTON, Jason; NOBLE, Jason & BRYDEN, John (2018): *Methodological Investigations in Agent-Based Modelling: With Applications for the Social Sciences (Methodos Series).* Springer.

TAYLOR, Simon (2014): *Agent-Based Modeling and Simulation (OR Essentials).* Palgrave Macmillan. ISBN: 9781349497737.

Livros sobre Economia Complexa:

Beinhocker, E. D. (2006). *The origin of wealth: evolution, complexity, and the radical remaking of economics*. Boston, Mass: Harvard Business School Press.

Colander, D. C. (2000). *Complexity and the History of Economic Thought: Selected Papers from the History of Economics Society Conference*. London; New York: Routledge. Retrieved from http://www.crcnetbase.com/isbn/9780203436004

Colander, D. C. & Kupers, R. (2014). *Complexity and The Art of Public Policy* (1st ed.). Princeton, NJ: Princeton University Press.

Elsner, W., Heinrich, T., & Schwardt, H. (2015). *The microeconomics of complex economies: evolutionary, institutional, neoclassical, and complexity perspectives*. Amsterdam; Boston: Academic Press.

Galam, S. (2012). *Sociophysics*. Boston, MA: Springer US. Retrieved from http://link.springer.com/10.1007/978-1-4614-2032-3.

Mirowski, P. (1989). *More heat than light: economics as social physics, physics as nature's economics*. Cambridge; New York: Cambridge University Press.

Mitchell, M. (2009). *Complexity: a guided tour*. Oxford [England]; New York: Oxford University Press.

Moore, B. J. (2006). *Shaking the invisible hand: complexity, endogenous money and exogenous interest rates* (1st ed.). New York, NY: Palgrave MacMillan.