

Computational Economics

SYLLABUS

Information at a glance

Course:	Computational Economics
Web Site:	http://www.dma.unive.it/~paolop
Professor:	Paolo Pellizzari (email: paolop@unive.it)
Lectures:	See schedule below
Office Hours:	After class or by appointment

Purpose of course. The course aims to offer a review of some computational agent-based models in finance and economics. We survey a host of research in simulation-oriented models exploring the consequences and richness of local interactions of members of a population.

Some topics will be emphasized in the course:

1. Artificial markets (part 1)
2. Complexity in Economics (part 2)
3. Learning and the value of information (scattered)

Prerequisites. No specific knowledge is assumed, some interest in computational methods and simulation is welcome (but will be hopefully ignited anyway).

Teaching method. There will be 15 one-hour (7 two-hours) meetings to describe various models, with a discussion of their motivation, mathematical formulation and (computational) results. In many cases, a program will be used to reproduce the model and/or collect the data that are analyzed. No programming effort by will be mandatorily required but, in some cases, learning how to run some code written by others is necessary to get/see/analyze the results.

Examination policy. You have to give a 30 minutes presentation of two papers, one taken from the reading list and another containing related material but not in the list.

Alternatively, you have to give a 30 minutes presentation of some computational results obtained (writing from scratch or modifying some program) reproducing a model that was covered in class.

Grading will be based on active participation (20%) to lectures and my assessment of your talk and/or work (50%). The remaining part (30%) will be assigned by the other students taking the course.

Contents. One or more papers are tentatively assigned to 15 one-hour lectures.

- Part 1, Artificial markets.
 1. [Day and Huang, 1900].
 2. [Gode and Sunder, 1993], [Maslov, 2000].
 3. [Cliff, 2003], [Audet et al., 2001], [Bottazzi et al., 2005].
 4. [Ghoulmie et al., 2005], [Lux and Marchesi, 1999].
 5. [LiCalzi and Pellizzari, 2003], [LiCalzi and Pellizzari, 2005].
 6. [Arthur et al., 1997].
 7. [Hommes, 2005] (section 8), [Georges, 2005].

- Part 2, Complexity in economics.
 1. Schelling model and [Pancs and Vriend, 2003].
 2. [Arthur, 1994].
 3. [Galam, 2002] and a spatial variation on the theme.
 4. [Lettau, 1997], [Szpiro, 1997].
 5. [Schredelseker, 1999], [Huber and Kirchler, 2004].
 6. [Miller and Page, 2004].
 7. [Epstein, 2001].
 8. One degree of freedom (to be filled by [Arthur, 1989] or [Wieland and Westerhoff, 2004] if needed).

Schedule

Just too early!

Reading list

- [Arthur, 1989] Arthur, B. (1989). Competing technologies, increasing returns, and lock-in by historical events. *The Economic Journal*, 99:116–131.
- [Arthur, 1994] Arthur, B. (1994). Inductive reasoning and bounded rationality. *The American Economic Review*, 84:606–411.
- [Arthur et al., 1997] Arthur, W., Holland, J., LeBaron, B., and Taylor, P. (1997). Asset pricing under endogenous expectations in an artificial stock market. In Arthur, W., Lane, D., and Durlauf, S., editors, *The economy as an evolving complex system II*. Addison-Wesley.
- [Audet et al., 2001] Audet, N., Gravelle, T., and Yang, J. (2001). Optimal market structure: Does one shoe fit all? Technical report, Bank of Canada.

- [Bottazzi et al., 2005] Bottazzi, G., Dosi, G., and Rebesco, I. (2005). Institutional architectures and behavioral ecologies in the dynamics of financial markets. *Journal of Mathematical Economics*, 41(1–2):197–228.
- [Cliff, 2003] Cliff, D. (2003). Explorations in evolutionary design of online auction market mechanisms. *Electronic Commerce Research and Applications*, 2:162–175.
- [Day and Huang, 1900] Day, R. and Huang, W. (1900). Bulls, bears and market sheep. *Journal of Economic Behavior and Organization*, 14(3):299–329.
- [Epstein, 2001] Epstein, J. (2001). Learning to be thoughtless: Social norms and individual computation. *Computation Economics*, 18:9–24.
- [Galam, 2002] Galam, S. (2002). Modeling rumors: the no plane pentagon french hoax case. Technical report, arXiv:cond-mat/0211571.
- [Georges, 2005] Georges, C. (2005). Staggered updating in an artificial financial market. *Mimeo*.
- [Ghoulmie et al., 2005] Ghoulmie, F., Cont, R., and Nadal, J. (2005). Heterogeneity and feedback in an agent-based market model. *Journal of Physics: condensed matter*, 17:1259–1268.
- [Gode and Sunder, 1993] Gode, D. and Sunder, S. (1993). Allocative efficiency of markets with zero intelligence traders. *Journal of Political Economy*, 101:119–137.
- [Hommes, 2005] Hommes, C. (2005). Heterogeneous agent models in economics and finance. In Judd, K. and Tesfatsion, L., editors, *Handbook of Computational Economics II: Agent-Based Computational Economics*, forthcoming.
- [Huber and Kirchler, 2004] Huber, J. and Kirchler, M. (2004). The value of information in markets with heterogeneously informed traders and experimental and a simulation approach. Technical report, Department of Finance, University of Innsbruck.
- [Lettau, 1997] Lettau, M. (1997). Explaining the facts with adaptive agents: the case of mutual fund flows. *Journal of Economic Dynamics and Control*, 21:1117–1147.
- [LiCalzi and Pellizzari, 2003] LiCalzi, M. and Pellizzari, P. (2003). Fundamentalists clashing over the book: a study of order driven stock markets. *Quantitative Finance*, 3:470–480.
- [LiCalzi and Pellizzari, 2005] LiCalzi, M. and Pellizzari, P. (2005). Simple market protocols for efficient risk sharing. *Mimeo, submitted*.
- [Lux and Marchesi, 1999] Lux, T. and Marchesi, M. (1999). Scaling and criticality in a stochastic multi-agent model of a financial market. *Nature*, 397:498–500.
- [Maslov, 2000] Maslov, S. (2000). A simple model of an order-driven market. *Physica A*, 278:571–578.

- [Miller and Page, 2004] Miller, J. and Page, S. (2004). The standing ovation problem. *Complexity*, 9:8–16.
- [Pancs and Vriend, 2003] Pancs, R. and Vriend, N. (2003). Schelling’s spatial proximity model of segregation revisited. Technical report, Queen Mary University of London.
- [Schredelseker, 1999] Schredelseker, K. (1999). On the value of information in financial decisions: a simulation approach. Technical report, Free University of Bozen - Bolzano.
- [Szpiro, 1997] Szpiro, G. (1997). The emergence of risk aversion. *Complexity*, 2:31–39.
- [Wieland and Westerhoff, 2004] Wieland, C. and Westerhoff, F. (2004). Exchange rate dynamics, central bank interventions and chaos control methods. *Journal of Economic Behavior and Organization*, xxx:xxx–xxx.