Matthieu Cristelli

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I am a theoretical physicist passionate about complexity, in all its forms, graphic and photography. I have an extensive background in complexity theory and data modeling, statistical analyses, algorithm development for financial (financial markets modeling and time series analysis) and economic systems (quantitative macro-economic scenarios) and web-data.
I have a strong expertise in problem identification and problem solving, a wide vision combined with the ability of focusing on the key driving elements of a scenario/problem/analysis.
My researches and personal interests on topics bridging different disciplines (Physics, Mathematics, Economics, Finance, Social phenomena) have often led me to develop and adopt "hacking" or non-standard approaches in several contexts.
The research activities I developed along my career path aim at establishing an effective bridge between the complexity theory and economics.
I have also been involved in collaboration projects or I have acted as consultant for several companies (Boston Consulting Group, Royal Dutch Shell, Pangea Formazione, IPPR) .

PERSONAL DETAILS

Gender: Male
Date and Place of Birth: June 8TH, 1984 – Paris (France)
Citizenship: French, Italian

EDUCATION

Ph.D. in Theoretical Physics: Oct 2008 – Nov 2011, "Sapienza", Università di Roma

Project Title: *Complexity in Financial Markets: Modelling Psychological Behaviour in Agent-Based Models and Order Book Models.* (Thesis published by Springer)
Supervisor: Prof. Luciano Pietronero
Date of Thesis Defense: January 31st, 2012

Master's Degree in Physics: Oct 2006 - Sep 2008, "Sapienza", Università di Roma

Thesis Title: *Agent Based Model and Self-Organization of the Dynamics of the Financial Markets.*
Supervisor: Prof. Luciano Pietronero
Date of Graduation: September, 25th 2008
Final Mark: 110 /110 cum laude

Bachelor's Degree in Physics: Oct 2003 - Oct 2006, "Sapienza", Università di Roma

Thesis Title: *Statistical Mechanics of a Disordered System: 1D Ising Model.*
Supervisor: Prof. Angelo Vulpiani and Prof. Massimo Falcioni
Date of Graduation: October 2006
Final Mark: 110 /110 cum laude

PROFESSIONAL EXPERIENCE

POST DOC RESEARCHER: JAN 2012 – PRESENT

ISC-CNR, INSTITUTE OF COMPLEX SYSTEMS, "SAPIENZA", UNIVERSITÀ DI ROMA

SHORT DESCRIPTION: *Economic Complexity, characterization of country competitiveness and product complexity from systems of economical networks. Development of forecasting tools and methods of fundamental analysis for country/sector growth rates and portfolio allocation.*

CONSULTANT ROYAL DUTCH SHELL: SEP 2014 – JAN 2015

ROYAL DUTCH SHELL, THE NEDERLANDS

SHORT DESCRIPTION: *Industrial development and economic growth scenarios for South Africa*

COLLABORATION WITH THE BOSTON CONSULTING GROUP: JUNE 2013 - SEPTEMBER 2013

COLLABORATION WITHIN MY POSTDOC WITH THE BOSTON CONSULTING GROUP, SWEDEN

SHORT DESCRIPTION: *Development of analysis and methodology for a section of a BCG report for Swedish Government.*

CONSULTANT AT PANGEA FORMAZIONE: FEB 2012 – JULY 2012

PANGEA FORMAZIONE, ROMA (ITALY)

SHORT DESCRIPTION: *Forecasting touristic flows by social data for the roaming division of the Italian mobile provider TIM.*

TEACHING ACTIVITY: 2009 – 2015

COLLABORATION IN TEACHING ACTIVITY OF THE COURSE OF COMPLEX SYSTEMS AT SAPIENZA UNIVERSITY
SUPERVISION OF SEVERAL STUDENTS DURING THEIR MASTER'S AND PHD THESES

SUMMARY OF RESEARCH ACTIVITY: 2008 – PRESENT

THE MAIN AREAS OF MY RESEARCH EXPERIENCE FALL IN THE FOLLOWING FIELDS:

FINANCIAL SYSTEMS: *financial market modeling (agent-based models), quantitative analysis of specific technical trading techniques, development of tools for assessment of systemic risk.*

ECONOMIC SYSTEMS: *analysis of country import and export flows. Development of tools to evaluate the competitiveness of countries and the complexity of products. Development of forecasting and fundamental analysis tools for country growth rates, economic sectors, macroeconomic indicators and portfolio allocation.*

WEB-DATA ANALYSIS: *analysis of web-data as proxies for social, economic and financial indicators such as market activity (in collaboration with Yahoo! Research Lab.), touristic flows and phone usage.*

- Publication of several scientific papers on peer-reviewed journals, a complete list is provided in the appendix.
- Participation to several international conferences mainly on economic and financial topics, a list is provided in the appendix

PROJECTS

I am involved in the research activities of the following project:

GROWTHCOM: 2013-2016, EU PROJECT, CALL FP7-ICT-2013-10, website

CRISIS LAB.: 2012-2014 SPECIAL PROJECT OF ITALIAN GOVERNMENT, website

FOC: 2010-2014, EU PROJECT,FET-OPEN PROJECT, website

SKILLS AND SPECIALTIES

LANGUAGE: English (Fluent), French (Mother Tongue), Italian (Mother Tongue)

SPECIALTIES: Data analysis and modeling, Data mining and Big Data analysis, Data visualization, Data-driven metrics, Statistical analysis and tests, Modeling, Agent-based modeling, Complex systems, Economic Complexity, Economic Growth

MACHINE LANGUAGE: Python (+ several statistical, mathematical and visualization packages), C, C++(basic), Perl (very basic), shell scripting (basic)
OPERATIVE SYSTEM: Unix Environment (Mac OS X and Ubuntu), Windows
WORD PROCESSING PACKAGE: Microsoft Office, iWork, OpenOffice, LaTeX
E-PUBLISHING: iBooks Author
VISUALIZATION AND IMAGE EDITING: Photoshop, Camera Raw, Illustrator, Omnigraffle, Gephi, several Python packages
WEB-ANALYTICS: SEO, Google Analytics, Google Webmaster Tools, Google Trends

AWARDS

- Award for the achievement of the Master's Degree, "Mario Negri" Foundation (2010)
- Winner of a three-year Ph.D. scholarship in Physics, "Sapienza" Univ. di Roma (from Oct. 2008 to Oct. 2011).
- Ph. D. thesis awarded and published by Springer in Springer Theses Series.

PERSONAL INTERESTS/HOBBIES

Swimming, Photography and Sightseeing (http://www.thecuttingedgegallery.com), Drawing, Traveling, Tasting and Experiencing foreign cuisines.

References available on request

APPENDIX

PUBLICATIONS

1. V. Alfi, M. Cristelli, L. Pietronero, A. Zaccaria, *Minimal agent based model for financial markets I*, Eur. Phys. J. B 67, 385-397 (2009), ArXiv: 0808.3562.
2. V. Alfi, M. Cristelli, L. Pietronero, A. Zaccaria, *Minimal agent based model for financial markets II*, Eur. Phys. J. B 67, 399-417 (2009), ArXiv: 0808.3565.
3. V. Alfi, M. Cristelli, L. Pietronero, A. Zaccaria, *Mechanisms of self-organization and finite size effects in a minimal agent based model*, J. Stat. Mech. P03016 (2009), ArXiv: 0811.4256.
4. M. Cristelli, V. Alfi, L. Pietronero, A. Zaccaria, *Liquidity crisis, granularity of the order book and price Fluctuations*, Eur. Phys. J. B 73, 41-49 (2010), ArXiv: 0902.4159
5. A. Zaccaria, M. Cristelli, V. Alfi, F. Ciulla, L. Pietronero, *Asymmetric statistics of order books: The role of discreteness and evidence for strategic order placement*, Phys. Rev. E 81, 066101 (2010), ArXiv: 0906.1387
6. G. Caldarelli, M. Cristelli, A. Gabrielli, L. Pietronero, A. Scala, A. Tacchella, *A Network Analysis of Countries' Export Flows: Firm Grounds for the Building Blocks of the Economy*, PLoS ONE 7(10): e47278 doi:10.1371/journal.pone.0047278 (2012)
7. M. Cristelli, M. Batty, L. Pietronero, *There is more than power law in Zipf*, *Nature Scientific* Reports 2, 812 (2012)
8. I. Bordino, S. Battiston, G. Caldarelli, M. Cristelli, A. Ukkonen, I. Weber, *Web Search Queries Can Predict Stock Market Volumes*, PLoS ONE 7(7) e40014.doi:10.1371/journal.pone.0040014, ArXiv: 1110.4784
9. M. Cristelli, A. Zaccaria, L. Pietronero, *Universal relation between skewness and kurtosis in complex dynamics*, Phys. Rev. E 85, 066108 (2012)
10. A. Tacchella, M. Cristelli, G. Caldarelli, A. Gabrielli, L. Pietronero, *A New Metrics for Countries' Fitness and Products' Complexity*, Nature Scientific Reports 2, 723 (2012)
11. A. Tacchella, M. Cristelli, G. Caldarelli, A. Gabrielli, L. Pietronero, *Economic Complexity: Conceptual Grounding of a New Metrics for Global Competitiveness*, Journal of Economic Dynamics and Control 37(8) 1683-91 (2013)
12. M. Cristelli, A. Gabrielli, A. Tacchella, G. Caldarelli, L. Pietronero, *Measuring the Intangibles: a Metrics for the Economic Complexity of Countries and Products*, PLoS ONE 8(8): e70726. doi: 10.1371/journal.pone.0070726 (2013)
13. F. Battiston, M. Cristelli, A. Tacchella, L. Pietronero, *How metrics for economic complexity are affected by noise*, Complexity and Economics, DOI: 10.7564/13-COEC2 (2014) - link
14. F. Garzarelli, M. Cristelli, G. Pompa, A. Zaccaria, L. Pietronero, *Memory effects in stock price dynamics: evidences of technical trading*, Nature Scientific Reports 4, 4487 (2014)
15. M. Cristelli, A. Tacchella, L. Pietronero, *The Heterogeneous Dynamics of Economic Complexity*, PLoS ONE 10(2): e0117174. doi: 10.1371/journal.pone.0117174 (2015)
16. A. Zaccaria, M. Cristelli, R. Kupers, A. Tacchella, L. Pietronero, *A Case Study for a New Metrics for Economic Complexity: The Netherlands*, J Econ Interact Coord DOI 10.1007/s11403-015-0145-9 (2015)
17. R. Di Clemente, M. Cristelli, G. Chiarotti A. Tacchella, L. Pietronero, *Diversification vs Specialization in Complex Ecosystems*, PLoS ONE 9(11): e112525. doi: 10.1371/journal.pone.

0112525

18. A. Zaccaria, M. Cristelli, A. Tacchella, L. Pietronero, *How the Taxonomy of Products Drives the Economic Development of Countries Case* , PLoS ONE 9(12): e113770. doi: 10.1371/journal.pone.0113770
19. F. Piasini, M. Cristelli, A. Tacchella, L. Pietronero, *Measuring Market's Coherence* (in preparation, 2014)
20. M. Cristelli, A. Tacchella, A. Zaccaria, L. Pietronero, *Development and Growth Paths of Sub-Saharan Countries in the Framework of Economic Complexity* (submitted Proceedings Columbia University, 2014)

a) V. Alfi, M. Cristelli, L. Pietronero, A. Zaccaria, *Reconstructing Agents' Strategies from Price Behavior*, Econophysics of Order-driven Markets - Springer (2011) - Ed. Abergel et al.

b) M. Cristelli, A. Zaccaria, L. Pietronero, *Critical Overview of Agent-Based Models for Economics*, Proceedings of the School of Physics "E. Fermi", course CLXXVI, 2010, Varenna,e-Print ArXiv: 1101.1847

c) A. Zaccaria, M. Cristelli, L. Pietronero, *Reaction to extreme events in a minimal agent based model*, Proceedings VI Kolkata Conference – Econophysics of Systemic Risk and Dynamics, Part 2 (2013) - Ed. Abergel et al.

d) M. Cristelli, G. Caldarelli, A. Gabrielli, L. Pietronero, A. Scala, A. Tacchella, *Competitors' communities and taxonomy of products according to export fluxes*, Eur. Phys. S.T. 212, 115-120 (2012)

e) A. Tacchella, M. Cristelli, A. Zaccaria, L. Pietronero, *Time evolution of financial cross-correlation coefficients across market crisis*, Int. J. of Mod. - Phys. Conf. Series 16, 82-92 (2012)

f) M. Cristelli, A. Tacchella, L. Pietronero, *An overview of the new frontiers of Economic Complexity*, Proceedings of conference EPKOL VII (2013) – Ed. Abergel et al.

g) L. Pietronero, M. Cristelli, A. Tacchella, *New Metrics for Economic Complexity: Measuring the Intangible Growth Potential of Countries*, Proceedings of INET plenary conference Hong Kong (2013)

- M. Cristelli, *Complexity in Financial Markets: Modeling Psychological Behavior in Agent-Based Models and Order Book Models*, Springer Theses Series (2013)
- M. Cristelli, A. Tacchella, L. Pietronero, *Economic Complexity: Measuring the Intangibles*, Ebook available on iBookstore (2014)

Papers indicated by roman letters are conference proceedings, bullets refer to books.

CONFERENCES

1. NetSci 2009 - International Workshop on Network Science Jun 29 - July 3, 2009 Venice (Italy)
2. Econophysics Colloquium 2009 (13th School of Complexity) Oct 25 - Nov 1, 2009 Centro Ettore Majorana, ERICE (TP - Italy) – *Poster*
3. Applied Financial Valuation – Macofin Feb 19, 2010 LUISS Rome (Italy)
4. XV Convegno Nazionale di Fisica Statistica e dei Sistemi Complessi Jun 21 - Jun 23, 2010 Parma (Italy) – *Contributed Talk*
5. International School of Physics Enrico Fermi - Complex Materials in Physics and Biology Jun

29 - July 9, 2010 Varenna (Italy)

6. Paths in Complexity Sep 23 - Sep 24, 2010 Rome (Italy)
7. International Conference in Statistical Physics ΣΦ 2011 Jul 11 - Jul 15, 2011 Larnaca (Cyprus) – *Contributed Talk*
8. ECCS 2012 Sep 3 - Sep 7, 2012 Bruxelles (Belgium) – *Contributed Talk*
9. Latsis 2012 Sep 11 - Sep 14, 2012 ETH Zurich (Switzerland) – *Poster*
10. EPKOL VII 2012 Nov 8 - Nov 12, 2012 Kolkata (India) – *Invited Talk*
11. Changing of the Guard? INET Plenary Conference April 4-6, 2013 Hong Kong
12. Econophysics and Networks across the scales 2013 May 27 – May 31, 2013 Lorenz Center, Leiden (Netherlands) – *Invited Talk*
13. FNet 2013 Jul 17 – Jul 19, 2013, Kyoto University, Kyoto (Japan) – *Invited Talk*
14. Statphys25 Jul 21 – Jul 26, 2013 Seoul National University, Seoul (S. Korea) – *Contributed Talk*
15. Getting inside the black box (Workshop) Aug 7 – Aug 31, 2013 Santa Fe Institute, Santa Fe (NM, USA)
16. FisMat 2013 Sept 9 - Sept 13, 2013, Milano (Italy) - *Contributed Talk*
17. ICE 2014 May 31 - Jun 2, 2013, Shanghai (China) - *Contributed Talk*
18. International Conference in Statistical Physics ΣΦ 2014 Jul 7 - Jul 11, 2014 Rhodes (Greece) – *Invited Talk*
19. SEDPAM@ECCS2014 Sep 2014, Lucca (Italy) – *Contributed Talk*
20. ECCS2014 Sep 2014, Lucca (Italy) – *Invited Talk*
21. INET Plenary Conference April 8-11, 2015 Paris