IRENA VODENSKA

Department of Administrative Sciences, Metropolitan College, Boston University
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Education

PH.D., ECONOPHYSICS (STATISTICAL FINANCE), University Professors Program, Boston University   9/2005 – 9/2009
Dissertation*: Interdisciplinary Approaches to Understanding and Forecasting Volatility*
Advisor*: Professor H. Eugene Stanley*
Award for Outstanding Doctoral Dissertation for the academic year 2009-2010

MA, MASTER OF ARTS IN ECONOMICS, *Focus in Health Economics and International Finance*   9/2019 – 5/2021
College of Arts and Sciences, Boston University, Boston, MA

MBA, MASTER OF BUSINESS ADMINISTRATION, *Major in Finance with International emphasis*   9/1994 – 5/1996
Owen Graduate School of Management, Vanderbilt University, Nashville, TN

BS, MANAGEMENT OF INFORMATION SYSTEMS, *Major in Database Management*   10/1988 – 10/1993
School of Business Management*,* University of Belgrade*,* Yugoslavia

Certifications and Charters

CFA, CHARTERED FINANCIAL ANALYST, CFA INSTITUTE   NOVEMBER, 2004

NATIONAL ASSOCIATION OF SECURITIES DEALERS (NASD)
SERIES 7, SERIES 63, SERIES 55 CERTIFIED SECURITIES DEALER/TRADER   SINCE 1997

Academic Appointments

PROFESSOR, ADMINISTRATIVE SCIENCES DEPARTMENT, MET COLLEGE, BOSTON UNIVERSITY, *Boston, MA*   3/2021 - PRESENT
- Established cross-college research collaboration with BU faculty and graduate students Including the Law School, and the College of Ars and Sciences (Economics and Physics)
- Developed strategies for course cross-listings between Metropolitan College and College of Arts and Sciences (Physics), and co-developed and taught cross-college courses
- Established a Laboratory for Interdisciplinary Finance and Economics (LIFE) Research at MET

ASSOCIATE PROFESSOR, ADMINISTRATIVE SCIENCES DEPARTMENT, MET COLLEGE, BOSTON UNIVERSITY, *Boston, MA*   5/2016 – 3/2021
- Taught and developed courses in finance area including investments, corporate finance, derivative securities and markets, multinational finance and financial concepts
- Developed courses for online, blended, and face-to-face delivery modes, with technology-enhanced methods and interactive teaching tools
- Highly involved in service to the university, college, and profession

DIRECTOR, FINANCE PROGRAMS, ADMINISTRATIVE SCIENCES DEPARTMENT, MET COLLEGE, BOSTON UNIVERSITY   9/2018 - PRESENT
- Established cross-pollination strategies for the online and campus finance programs
- Developed new courses for the finance curriculum in online and face-to-face formats
- Hired full-time and part-time faculty to develop and teach new finance courses
- Implemented new degree concentrations and certificate options resulting in increased enrolments
- Prepared and submitted a CFA Institute University Affiliation Program Application

COORDINATOR, FINANCE PROGRAMS, ADMINISTRATIVE SCIENCES DEPARTMENT, MET COLLEGE, BOSTON UNIVERSITY   9/2016 – 8/2018
- Reviewed current MET courses and finance programs from other institutions
- Created an academically rigorous and competitive curriculum in all delivery formats

- Defined the core, concentrations, and elective course structure
- Introduced new finance courses that are relevant and needed for a modern finance curriculum
- Proposed attractive degree concentrations and certificate options

ASSISTANT PROFESSOR, ADMINISTRATIVE SCIENCES DEPARTMENT, MET COLLEGE, BOSTON UNIVERSITY, *Boston, MA*   9/2009 – 5/2016
- Conducted active interdisciplinary research, with continuous grant support and solid publication record in top journals and scientific conferences
- Initiated collaborative research projects involving faculty and students from several MET departments and the Physics department at B.U. Graduate School of Arts and Sciences

LECTURER IN FINANCE, BOSTON UNIVERSITY, *Boston, MA*   9/2002 – 9/2009
- Taught Investments and Portfolio Management courses at Metropolitan College and Questrom
- Taught Financial Management and Capital Budgeting courses at Metropolitan College

SENIOR RESEARCH FELLOW, DEPARTMENT OF PHYSICS, CAS, BOSTON UNIVERSITY**, *Boston, MA*   9/2009 – PRESENT
- Conducted interdisciplinary research in the areas of Econophysics, Complexity Science, Network Theory and Applications
- Supervised Ph.D. students on the following research projects: 1) Developing models and forecasting tools for the global financial crisis; 2) investigating endogenous and exogenous factors that contribute to cascading failures and systemic risk buildup in networks of financial institutions; 3) Analyzing influences in coupled financial market networks and news sentiments

VISITING PROFESSOR, COLLEGE OF COMPUTER SCIENCE AND ENGINEERING   9/2014 – PRESENT
    SS. CYRIL AND METHODIUS UNIVERSITY, SKOPJE, MACEDONIA
- Collaborated on research projects involving big data analytics in finance and economics
- Lectured in the area of Big data analytics and news sentiment impact on financial markets
- Coordinated writing of European Commission proposals within the Horizon 2020 framework

VISITING PROFESSOR, SCHOOL OF BUSINESS MANAGEMENT, BELGRADE UNIVERSITY, BELGRADE, SERBIA   9/2015 - PRESENT
- Established research collaboration with the finance department
- Delivered visiting lectures at the school's international finance program
- Initiated a collaborative research effort on consortium working on a proposal on "Social media applications in policymaking" to the European Commission

VISITING PROFESSOR, ECONOMICS INSTITUTE AND SCHOOL OF ECONOMICS   9/2016 – PRESENT
    SS. CYRIL AND METHODIUS UNIVERSITY, SKOPJE, MACEDONIA
- Member of the Editorial Board of the International Journal for Economic Development published by the Economics Institute and indexed by EBSCO
- Lectured in the area of Macroprudential regulation and policy tools for monitoring global Financial networks
- Established interdisciplinary research collaboration in the field of text mining and data analytics

ASSOCIATE DIRECTOR FOR RESEARCH, CENTER FOR FINANCE, LAW, AND POLICY, BOSTON UNIVERSITY, *Boston, MA*   4/2012 – 4/2013
- Served as the first associate director of research at the CFLP
- Designed and developed the Center's request for proposals (RFP) process
- Participated in research proposal reviews and offered funding recommendations

FOUNDING MEMBER, STEERING COMMITTEE, CENTER FOR FINANCE, LAW, AND POLICY, BOSTON UNIVERSITY   1/2011 – 4/2013
- Participated in the creation of the Center, its policies and mission since its early conceptual phase
- Contributed to strengthening the research profile of the Center by including it in a significant international research proposal that I submitted as the P.I. to the European Commission

RESEARCH ASSISTANT, DEPARTMENT OF PHYSICS, BOSTON UNIVERSITY, *Boston, MA*   9/2005-8/2009
- Engaged in research on volatility return intervals of the S&P 500 index and two common models
- Investigated the relation between volatility in financial markets and Omori processes

RESEARCH ASSISTANT, OWEN GRADUATE SCHOOL OF MANAGEMENT, VANDERBILT UNIVERSITY, *Nashville, TN* 9/1995 – 5/1996
- Involved in the research of Initial Public Offerings (IPOs) of privately-owned companies
- Used Microsoft Access Database Management System to organize and analyze financial data

TEACHING ASSISTANT, OWEN GRADUATE SCHOOL OF MANAGEMENT, VANDERBILT UNIVERSITY, *Nashville, TN* *9/1995 – 5/1996*
- Served as a teaching assistant for the International monetary and fiscal policy course

Professional Experience

CHIEF INVESTMENT OFFICER & FOUNDING PARTNER, AMECTRON INTERNATIONAL LLC, *Boston, MA* *7/2008 – Present*
- Developed investment and trading models for proprietary portfolio management
- Tested and implemented investment strategies based on quantitative research
- Created and applied hedging strategies using derivative securities
- Designed and tested security trading algorithms under various macroeconomic scenarios
- Measured portfolio efficiencies by analyzing risk-return tradeoffs and correlations among different securities comprising the portfolio
- Monitored and dynamically managed financial asset portfolios

DIRECTOR OF MAJOR GIFTS, OFFICE OF DEVELOPMENT, NEW ENGLAND BAPTIST HOSPITAL, *Boston, MA* *12/2006 – 4/2008*
- Played a significant role in the capital campaign as a member of the President's cabinet
- Raised significant major gifts from physicians, trustees, and patients
- Initiated a portfolio of international prospects from the finance industry that resulted in a seven-figure solicitation

MAJOR GIFTS OFFICER, DEVELOPMENT AND ALUMNI RELATIONS, BOSTON UNIVERSITY, *Boston, MA* *9/2003 – 12/2006*
- Initiated and developed relationships with Financial Industry and Wall Street-based prospects
- Actively cultivated and solicited prospects for B.U.'s Student Village project
- Raised six-figure gifts for naming opportunities at different B.U. schools and colleges

HEAD TRADER, EUROPEAN EQUITY TRADING, JPP EUROSECURITIES INC., *New York City, NY* *7/2000 – 2/2002*
- Founded and ran the New York-based European Markets trading operation
- Advised U.S. institutional clients involved in European portfolio investments
- Analyzed international mergers and acquisitions and developed M&A trading strategies
- Generated and implemented international pair (spread) trading strategies
- Developed an international program trading of index securities and market index futures

ASSISTANT VICE PRESIDENT, RISK ARBITRAGE, J.C. BRADFORD & CO. INVESTMENT BANK, *Nashville, TN* *5/1995 – 6/2000*
- Actively involved in raising funds from US Hedge Funds and advising fund managers
- Managed $10+ million proprietary funds invested in U.S. securities markets
- Implemented sophisticated fund risk management using derivative products
- Achieved strong portfolio returns using proprietary developed trading techniques and tools
- Analyzed convertible fixed income securities and developed pricing structure models
- Traded NASDAQ and NYSE common stock and preferred convertible securities
- Designed and implemented convertible bonds and risk arbitrage databases

INFORMATION SYSTEM ARCHITECT AND ANALYST, ALMAKO BANK, *Skopje, Republic of Macedonia* *9/1992 – 8/1994*
- Designed and developed a variety of banking databases systems such as:
  - International interbank electronic payment system database
  - Letter of credit database for international clients accompanied by an alert system
  - Domestic and international loan database including payment reminder system
  - Internal bank employee database and bank product database
  - External client and prospective client database

Teaching, Research, and Service

Courses Taught
- Investment Analysis and Portfolio Management (AD717 F2F, AD717 EL, AD717 OL)
- Derivative Securities and Markets (AD713 F2F, AD713 OL)
- Corporate Finance (AD731 F2F, AD731 EL, AD731 OL)
- International Finance and Trade (AD763 F2F, AD763 OL)
- Financial Markets and Institutions (AD712 OL)
- Financial Concepts (AD632 F2F)
- Financial Regulation and Ethics (AD678 F2F, AD678 OL)
- Econophysics (CAS PY538)
- Investment Analysis (SMG FE445)
- Current Trends in Business (CEU, San Paolo University, Madrid, Spain)
- Financial Markets Innovation (Munich Business School, Munich, Germany)

Courses Developed (Co-developed)
- Derivative Securities and Markets (AD713 F2F, AD713 OL) – developed
- Financial Regulation and Ethics (AD678 F2F, AD678 OL) – developed
- International Finance and Trade (AD763 F2F, AD763 OL) – developed
- Financial Concepts (AD632 OL) – co-developed
- Quantitative Methods for Finance (AD685 OL) – co-developed
- Blockchain Finance (AD528 OL) – co-developed
- Interdisciplinary Methods for Quantitative Finance (AD587 OL) – co-developed

Research Areas
- **Interdependent network theory and systemic risk modeling**:
    - Using a bipartite network approach to simulate toxic asset impact on financial crisis propagation across the U.S., European and Japanese bank networks
    - Modeling complex financial and economic systems such as bank liquidity networks and interdependent financial market networks
    - Investigating interdependencies in global financial networks using complex principal component analysis and community detection algorithms to study stock and foreign exchange financial markets
    - Studying the European Sovereign debt crisis and modeling the relationships within the European bank-Government debt coupled network

- **Big data analytics, machine learning, artificial intelligence, and complex economic systems**:
    - Using big data including intraday pricing and news streaming to forecast global financial market returns
    - Investigating the relations between news sentiments and risk and return time series for global equities, foreign exchange, and international stock market indices
    - Studying extensive news archives of international news to understand the relationship between news sentiments and macroeconomic indicators
    - Investigating natural language processing approaches, including deep learning and neural network methods, to classification algorithms for financial and economic news topic recognition
    - Studying the challenges and opportunities of ethically responsible machine learning in FinTech, and understanding the possibilities to alleviate human biases by introducing computer-based decision-making systems in customer-centered portfolio management

- **Blockchain Opportunities and Challenges, and Cryptocurrency Price Forecasting**:
    - Studying the network of bitcoin transactions and price dynamics (volatility) of cryptocurrencies
    - Investigating financial micro-blog impulses effect on bitcoin prices and analyzing the relationship of bitcoin prices with prices of other financial assets
    - Modeling the interdependent network dynamics of the most liquid cryptocurrency prices and using machine learning methodologies to study and quantify the news related to these cryptocurrencies.

Service

Boston University
- Director, MET Finance Programs (2018-Present)
- Coordinator, MET Finance Programs (2016-2018)
- Learn from Anywhere (LfA) Coach for Metropolitan College (2020-Present)
- Member, Boston University LfA Advisory Board (2020-Present)
- Member, MET College Appointment, Promotion, and Tenure Committee (2018-Present)
- Member, Executive Committee, MET (2014-2015, 2017-Present)
- Member, Boston University Strategic Planning Committee (2018-2019)
- Member, Boston University General Education Committee (2017-2019)
- Member, MET Administrative Sciences Faculty Search Committee (2018-2019)
- Member, Actuarial Science Chair Search Committee (2017)
- Chair, Faculty Council Budget Committee, Boston University (2010-2014)
- Vice-Chair, University Council Committee on Budget, Boston University (2010-2014)
- Member, B.U. Board of Trustees Advisory Committee on Socially Responsible Investments (2013-2014)
- Chair, Administrative Sciences Department Faculty Search Committee, MET (2015-2017)
- Member, Academic Policy Committee, MET (2015-2017)
- Member, Administrative Sciences Department Strategic Plan Committee, MET (2010-2011)
- Member, Faculty Expectations Committee, MET (2011)
- Member, Faculty Merit Review Committee, MET (2011-2014)
- Member, Administrative Sciences Department Faculty Search Committee, MET (2012-2013)
- Member, Administrative Science Department Mission Statement Revision Committee, MET (2012)
- Co-chair, AACSB Learning Objectives Committee, Administrative Science Department, MET (2010)

Scientific Journal Reviewer
- Physica A (2009-present)
- Journal of Economic Interaction and Coordination (JEIC) (2013-Present)
- PlosOne (2013-Present)
- Nature's Scientific Reports (2013-Present)
- Journal of Financial Stability (2017-Present)
- Nature Reviews Physics (2020-Present)

Editorial Board Member
- Cambridge University Press – Elements of Econophysics
- Frontiers in Sustainable Food Systems – The Frontiers Open Access Journal
- Entropy Journal Topics Board – MDPI Journals

Conference and Workshop Organizer (Co-Organizer)
- International School and Conference on Network Science (NetSci20), Rome, Italy, September 17-25, 2020
- Big data in Economics, Science, and Technology (BEST) Conference (2013-Present)
- Workshop on Complex Systems in Finance and Economics, Kyoto, Japan, Jan 17, 2020

CFA Institute – Boston Securities Analyst Society (BSAS)
- Taught CFA (Chartered Financial Analyst) preparatory courses for Level II CFA Examination (2009-2014)
- Served as a member of the BSAS Educational Committee involved in initiatives to bridge the gap between the financial industry and academia by promoting joint professional programs (2009-2013)

Grants and Awards

1. Principal Investigator **(PI)** for Boston University on a **Department of Defense, Network Science Division, Army Research Office (ARO)** awarded Grant titled: **"Student and Faculty Support for Participation at the International Conference on Network Science (NetSci 2020)** – Sponsor Award ID: W911NF2010187 **– Amount $18,000**   2020 – 2021

2. Participant (cooperating partner) in the **Post-K computer grant** awarded by the **Ministry of Education**, **Culture, Sports, Science, and Technology (MEXT), Japan**, titled: **Exploratory challenges: Studies of Multi-level Spatiotemporal Simulation of Socioeconomic Phenomena, Macroeconomic Simulations**, as a member of the Nihon University team – **Amount 215,000,000 Yen ($2.1 Million) for the Consortium of which 24,000,000 Yen ($240,000) for Nihon University**   2016 – 2019

3. Principal Investigator (**PI**) for Boston University on **National Science Foundation** (NSF) awarded Grant titled: "**Modeling systemic risk: Finding precursors of emerging financial crises**" – EAGER Award number: SES-1452061 – **Amount $57,721**   9/2014 – 9/2015

4. Principal Investigator (**PI**) for Boston University on **European Commission** awarded Grant titled "Forecasting Financial Crises" - FET Open Project "FOC" 255987 and "FOC-INCO" 297149 - **Amount $3.5million for the Consortium of which $300,000 for BU**   3/2012 – 3/2014

5. Owen Graduate School of Management Fellowship, Vanderbilt University   9/1995 – 5/1996

6. Alexander Hamilton Fulbright Fellowship   1994

Select Synergetic Activities and Skills

In the Press

- **Interview: Forecasting and Financial Crisis**
  http://forecastingcrises.wordpress.com/2013/06/11/irena-vodenska-foc-project-we-need-financial-regulatory-reform/

- **Simons Foundation – Quanta Magazine: Illuminating Science**
  https://www.quantamagazine.org/20130318-treading-softly-in-a-connected-world/

- **CEU San Pablo University, Madrid – Interview and Talk on Instagram: Tips from Boston for our students**
  https://www.uspceu.com/prensa/noticia/por/id/6662

- **Evaluation of Sentiment Analysis: A Reflection on the Past and Future of NLP (Towards Data Science)**
  https://towardsdatascience.com/evaluation-of-sentiment-analysis-a-reflection-on-the-past-and-future-of-nlp-ccfd98ee2adc

Languages

- English, Italian, French-basic knowledge, Serbian/Croatian/Bosnian/Montenegrin, Bulgarian, Macedonian (native)
- Basic understanding and reading knowledge of Spanish and Greek

Advisors, Collaborators, and Advisees

- Ph.D. advisor: **Gene Stanley**, William Fairfield Warren Distinguished Professor; Professor of Physics; Professor of Chemistry; Professor of Biomedical Engineering; Professor of Physiology (School of Medicine), Director, Center for Polymer Studies Department of Physics, Boston University

- Research collaborators: **Andreas Joseph**, **Antoaneta Serguieva, and Pablo Winant,** Bank of England, **Di Zhou**, Bloomberg, L.P., **Guido Caldarelli**, Center for Complex Systems, La Sapienza University, Rome, Italy, **Tomislav Smuc, Matija Piskorec,** and **Nino Antulov-Fantulin**, Rudjer Boshkovic Institute, Zagreb, Croatia, **Igor Mozetic** and **Petra Kralj** Jozhef Shtefan Institute, Ljubljana, Slovenia, **Hideaki Aoyama** and **Yohei Sakamoto**, Kyoto University, Japan, **Yoshi Fujiwara**, University of Hyogo, Japan, **Hiroshi Iyetomi, and Yuta Arai**, Niigata University, Japan, **Stefano Battiston,** University of Zurich, Switzerland, **Sergey Buldyrev**, Yeshiva University, New York, NY, **Shlomo Havlin**, Bar Ilan University, Israel, **Mario Bertella** and **Marislei Nishijima**, Sao Paulo State University, Brazil, **Kazuko Yamasaki**, Tokyo University, Japan, **Dror Kenett**, Office of Financial

Research, Washington, D.C., **Lidia Braunstein**, National University of Mar del Plata, Argentina, **Sary Levy-Carciente**, Central University of Venezuela, Caracas, **Dimitar Trajanov, Kosta Mishev, Ana Gjorgjevikj, Jovan Davchev,** Faculty of Computer Science and Engineering, Ss. Cyril and Methodius University, Skopje, Macedonia

- Ph.D. student advisor and Ph.D. dissertation committee member for **Xuqing Huang** (graduated in 2013), N**ima Dehmamy and Chester Curme** (graduated in 2015), **Antonio Majdandzic** (graduated in 2016)**, Asher Mullokandov Adam Avakian** (graduated in 2017), **Alexander Becker** (graduated in 2018), and **Jonathan Barlow** (current Ph.D. student).

- Masters students research advisor for **Borui Wang, Sompop Chaichanavitchakij, Hao Zhang, Quan C. Pham, Danling Zhou, Margaret Cruickshanks, Yong Phelam Nkfum, Hualong Yang, Justin Toporcer, Ana Mijailovic, Chiang Shang-Chih (Stanley), Lu Zhang, Fanghui Zhang, Alberto Gomez, Ya-Lan Tsao (Amy), Wenjing Cai, Qiyue Chen, Mengqi Zhao, Camilla Slethaug, Eugen Zeitler, Anirudh Kartikeya, Ashwin Pillai, Aishwarya Talapuru, Milos Zarkovic, Vlado Delevski, Rustam Tahirov, Marwane El Alaoui, Amin Aman, Wenzhang Zhou, Natali Ayoub.**

Publications

Peer-reviewed journal articles

1. Barlow, J., Vodenska, I. **Socio-Economic Impact of the Covid-19 Pandemic in the U.S.** *Entropy 23(6)*, 673. https://doi.org/10.3390/e23060673 (2021)

2. Vodenska, I., N. Dehmamy, A.P. Becker, S. Buldyrev, and S. Havlin, **Systemic Stress Test Model for Shared Portfolio Networks,** *Nature's Scientific Reports, 11(1) pp.1-12* | https://doi.org/10.1038/s41598-021-82904-y (2021)

3. Vodenska, I., Aoyama, H., Becker, A.P., Fujiwara, Y., Iyetomi, H., and Lungu, E., **Network approach to understanding the fragility of financial systems**, *Journal of Financial Stability, 52 (100803),* https://doi.org/10.1016/j.jfs.2020.100803, (2021)

4. Smolyak, A., Levy, O., Vodenska, I., Buldyrev, S., & Havlin, S., **Mitigation of cascading failures in complex networks**. *Nature's Scientific Reports, 10(1), 1-12, (2020).*

5. Souma, W., Vodenska, I., & Chitkushev, L. **New Measures of Journal Impact Based on the Number of Citations and PageRank,** *Journal of Digital Information Management, 18(1), 11 (2020).*

6. Iyetomi, H., Aoyama, H., Fujiwara, Y., Souma, W., Vodenska, I., & Yoshikawa, H., **Relationship between Macroeconomic indicators and economic cycles in the U.S.,** *Nature's Scientific Reports, 10(1),* (2020).

7. Mishev, K., Gjorgjevikj, A., Vodenska, I., Chitkushev, L. T., & Trajanov, D., **Evaluation of Sentiment Analysis in Finance: From Lexicons to Transformers,** *IEEE Access, 8, 131662-131682* (2020).

8. Souma, W., Vodenska, I. and Aoyama, H. **Enhanced news sentiment analysis using deep learning methods**, Journal of Computational Social Science, pp. 1-14; https://doi.org/10.1007/s42001-019-00035-x (2019)

9. Nishijima, M., Sarti, F.M., Vodenska, I., and Zhang, G., **Effects of decentralization of primary healthcare on diabetes mellitus in Brazil**, *Public Health, online: 2018 Nov 23; Vol. 166, pp. 108-120. DOI: 10.1016/j.puhe.2018.10.005.(2019)*

10. Kremer, M., Becker, P., Vodenska, I., Stanley, E., & Schäfer, R., **Economic and political effects on currency clustering dynamics**, *Quantitative Finance*, 1–12. doi.org/10.1080/14697688.2018.1532101 (2019)

11. Bertella M.A., Pires F.R., Rego H.H.A., Silva J.N., Vodenska I., and Stanley H.E. **Confidence and self-attribution bias in an artificial stock market,** *PLoS ONE 12(2): e0172258. DOI:10.1371/journal.pone.0172258 (2017)*

12. Y. Sakamoto and I. Vodenska, **Systemic risk propagation in a bank-asset network: New perspective of the Japanese banking crisis of the 1990s,** *Journal of Complex Networks, Oxford University Press, Vol. 5 Issue 2, pp. 315-333* DOI: *10.1093/comnet/cnw018 (2017)*

13. I. Vodenska, H. Aoyama, Y. Fujiwara, H. Iyetomi, and Y. Arai, **Interdependencies and causalities in complex financial networks**, *PLoS ONE 11(3): e0150994. DOI:10.1371/journal.pone.0150994* (2016)

14. A. Majdandzic, L. Braunstein, I. Vodenska, S. Levy, S. Havlin, and H.E. Stanley, **Multiple tipping points and optimal repairing in interacting networks,** *Nature Communications*, 7:10850 | DOI: 10.1038/ncomms10850 | *www.nature.com/naturecommunications (2016)*

15. Y. Sakamoto and I. Vodenska, **Impact of bankruptcy through asset portfolios,** *The European Physical Journal Special Topics 225 (6-7), 1311-1316 (2016)*

16. I. Vodenska, D. Zhou, A. Becker, D. Kenett, S. Havlin, and H.E. Stanley, **Community analysis of global financial markets,** *Risks*, *4(2), 13 (2016)*

17. I. Vodenska, **Ubiquitous Technology-Enhanced Teaching of Complex Financial Concepts,** *International Journal of Learning, Teaching and Educational Research, Vol. 14, No. 2 (2015)*

18. C. Curme, H.E. Stanley, and I. Vodenska, **Coupled network approach to the predictability of financial market returns and news sentiments,** *International Journal of Theoretical and Applied Finance, Vol 18, No. 7, (*2015)

19. D.Y. Kenett, X. Huang, I. Vodenska, S. Havlin, H.E. Stanley, **Partial correlation analysis: Applications for financial markets,** *Journal of Quantitative Finance, Vol. 15, Issue 4* (2015).

20. M. Piskorec, N. Antulov-Fantulin, P.K. Novak, I. Mozetic, M. Grcar, I. Vodenska, and T. Smuc, **Cohesiveness in Financial News and its Relation to Stock Market Volatility**, *Nature Scientific Reports 4, 5038, DOI:10.1038/srep05038* (2014).

21. L. Chitkushev, I. Vodenska, T. Zlateva, **Digital Learning Impact Factors: Student Satisfaction and Performance in Online Courses,** *International Journal of Information & Education Technology, Vol. 4, No. 4 (2014)*

22. X. Huang, I. Vodenska, S. Havlin & H.E. Stanley, **Cascading Failures in Bi-partite Graphs: Model for Systemic Risk Propagation,** *Nature Scientific Reports* 3, 1219; DOI:10.1038/srep01219 (2013).

23. I. Vodenska and L. Chitkushev**, Impact of Euro Adoption on Emerging European Countries**, *Management Journal,* 8(1): 47-67, (2013)

24. X. Huang, I. Vodenska, F.Z. Wang, S. Havlin, and H.E. Stanley, **Identifying influential directors in the United States corporate governance network**, *Physical Review E,* Vol. 84, 046101 (2011)

25. I. Vodenska, F.Z. Wang, P. Weber, K. Yamasaki, S. Havlin, and H.E. Stanley, **Comparison between volatility return intervals of the S&P 500 index and two common models**. *The European Physical Journal B,* Vol. 61, 217-223 (2008)

26. P. Weber, F. Wang, I. Vodenska-Chitkushev, S. Havlin, H.E. Stanley, **Relation between volatility correlation in financial markets and Omori processes occurring on all scales**, *Physical Review E,* Vol. 76, 016109 (2007)

Books and Book chapters

1. Book chapter: Vodenska, I. and Becker, A.P., **Interdependence, vulnerability, and contagion in financial and economic networks**, *New Perspectives and Challenges in Econophysics and Sociophysics, Eds. F. Abergel, B.K. Chakrabarti, A. Chakraborti, N. Deo, and K. Sharma, pp. 101-116, Springer, (May 15, 2019).*

2. Book: Abergel, F., Aoyama, H., Chakrabarti, B. K., Chakraborti, A., Deo, N., Raina, D., & Vodenska, I. (Eds.). **Econophysics and Sociophysics: Recent Progress and Future Directions.** *Springer* (2017).

3. Book chapter: D.Y. Kenett, J. Gao, X. Huang, S. Shao, I. Vodenska, S.V. Buldyrev, G. Paul, H.E. Stanley, and S. Havlin, **Network of Interdependent Networks: Overview of Theory and Applications, Chapter 1,** pages 3-36, in *Networks of Networks: The Last Frontier of Complexity,* edited by G. D'Agostino and A. Scala (Springer, Berlin, 2014).

Working papers

1. Dehmami, N., S. Buldyrev, S. Havlin, H.E. Stanley, and I. Vodenska, **Financial network stability indicators** *(to be submitted to Frontiers in Physics)*

2. D. Stosic, D. Stosic, I. Vodenska, H.S. Stanley, and T. Stosic, **"A new look at calendar anomalies: multifractality and day of the week effect,"** *(working paper)*

3. K. Mishev, I. Vodenska, L. Chitkushev, and D. Trajanov, *"***Forecasting corporate revenues by using natural language processing and deep learning neural network approaches"** *(working paper)*

4. Davchev, J., K. Mishev, I. Vodenska, L. Chitkushev, and D. Trajanov, **"News network connectivity effects on cryptocurrency volatility dynamics"** *(working paper)*

5. Vodenska, I. and Zhou, W**., "Understanding the effect of the financial crisis and the affordable care act on insurance claim costs"** *(working paper)*

6. A.P. Becker, I. Vodenska, and X. Zhang, **"Bank-firm lending relationships and covenant-based decision making"** *(working paper)*

7. A.P. Becker, D. Garlaschelli, and I. Vodenska, **"Reconstruction of financial networks and systemic risk modeling"** *(working paper)*

8. I. Vodenska and M. Zarkovic, "**Growth determinants of the old and the new E.U. countries"** *(working paper)*

9. I. Vodenska and V. Delevski, **"Optimal Government Size for Sustainable Growth"** (working paper)

Refereed conference proceedings

1. Vodenska, I., **Innovative Web-Based Tools for Finance Education,** *6th Annual International Conference on Computer Science and Education, June 26-29, 2010, Fulda/Munich, Germany*

2. Vodenska, I., Chitkushev, L. and Zlateva, T., **Integrating Informatics Into Graduate Finance Programs,** *7th Annual International Conference on Computer Science and Education, July 6-10, 2011, Sofia, Bulgaria*

3. Vodenska, I. and Chitkushev, L., **Ubiquitous Technology-Enhanced Teaching of Complex Financial Concepts,** *4th International Conference on Computer Supported Education (SCEDU) 2012, April 16-18, 2012, Porto, Portugal*

4. Vodenska, I. and Chitkushev, L. **Emerging European Countries and the Euro Adoption Policies,** *Euro-Conference 2012, July 12-14, 2012, Portoroz, Slovenia*

5. Vodenska, I. and Chitkushev, L. **Innovative tools for teaching complex financial concepts,** *9th Annual International Conference on Computer Science and Education, Fulda/Wurzburg, Germany, Jun 29–Jul 2, 2013*

6. Chitkushev, L., Vodenska, I., Zlateva, T., *Digital Learning Impact Factors: Student Satisfaction and Performance in Online Courses, Proc. of the ICIET 2014: 2nd International Conference on Information and Education Technology, Jan 2-3, 2014, Melbourne, Australia*

7. Vodenska, I., Joseph, A., Stanley, H.E., Chen, G., **Novel forecasting techniques using big data, network science and economics,** *22nd International Conference on Nonlinear Dynamics of Electronic Systems (NDES) 2014, July 4-6, 2014, Albena, Bulgaria* (Proceeding Series: Communications in Computer and Information Science, Vol. 438, edited by V. Mladenov and P. Ch. Ivanov, Springer, 2014)

8. Trajanov, D., Trajanovska, I., Chitkushev, L., and Vodenska, I., **Using Google Big Query for Data Analytics in Research and Education,** *The 12th Annual International Conference on Computer Science and Education in Computer Science, July 1-4, 2016, Nurnberg, Germany*

9. Vodenska, I., Trajanov, D., Trajanovska, I., and Chitkushev, L., **Impact of Global Events on Crude Oil Prices,** *The 12th Annual International Conference on Computer Science and Education in Computer Science, July 1-4, 2016, Nurnberg, Germany*

10. Trajanov, D., Vodenska, I., Cvetanov, G, and Chitkushev, L., **Data-driven analysis of trade, FDI and international relations on a global scale,** *The 13th Annual International Conference on Computer Science and Education in Computer Science, Jun 30 – Jul 3, 2017, Albena, Bulgaria*

11. Gjorgjevikj, A., Mishev, K., Vodenska, I., Chitkushev, L., and Trajanov, D., **Foreign direct investment net inflows: data-driven analysis,** *The 14th Annual International Conference on Computer Science and Education in Computer Science, Jun 29 – Jul 2, 2018, Boston, MA, USA*

12. Tolic, D., Antulov-Fantulin, N., Piskorec, M., Ce, Z., and Vodenska, I., **Inferring short-term volatility indicators from the Bitcoin blockchain,** *Springer proceedings from the 7th International Conference on Complex Systems and Their Applications, December 11-13, 2019, Cambridge, United Kingdom*

13. Dodevska, L., Petreski, V., Mishev, K., Gjorgjevikj, A., Vodenska, I., Chitkushev. L., Trajanov, D. **Predicting companies' stock price direction by using sentiment analysis of news articles,** *The 15th Annual International Conference on Computer Science and Education in Computer Science, Jun 28 – Jul 1, 2019, Fulda and Bamberg, Germany*

14. Mishev, K., Gjorgjevikj, A., Stojanov, R., Mishkovski, R., Irena Vodenska, Lubomir Chitkushev, and Dimitar Trajanov, **Performance Evaluation of Word and Sentence Embedding for Finance Headlines Sentiment Analysis,** *Proceedings of the 11th International Conference, ICT Innovations, October 17-19, 2019, Ohrid, North Macedonia*

15. Mishev, K., Gjorgjevik, A., Vodenska, I., Chitkushev, L., Souma, W. and Trajanov, D., **Forecasting Corporate Revenue by Using Deep-Learning Methodologies**, *Proceedings of the International Conference on Control, Artificial Intelligence, Robotics & Optimization (ICCAIRO), 2019, Volume: 1, Pages: 115-120, DOI Bookmark:10.1109/ICCAIRO47923.2019.00026*

16. *Davchev, J., Mishev, K., Vodenska, I., Chitkushev, L., and Trajanov, D*.**, Bitcoin Price Prediction using Transfer Learning on Financial Micro-blogs,** *Proceedings of the 16th Annual International Conference on Computer Science and Education in Computer Science, Sept 5, 2020*

Conference presentations

1. Vodenska, I., **Using Stock-Trak ® for Investment Analysis and Portfolio Management: An Academic Tool for Real Life Risk Assessment,** *First Instructional Innovation Conference, Boston University, March 2009*

2. Huang, X., Vodenska, I., Havlin, S. and Stanley, H.E., **A New Approach for Determining the Influence of Directors in U.S. Corporate Governance network,** *International Conference on Complex Network Science, May 10-14, 2010, Cambridge, MA*

3. Chitkushev, L., Zlatev, V. and Vodenska, I., **Advantages of Blended Format for International Programs**, *Second Annual FABDE Conference on Distance Education, May 11, 2010, Boston, MA*

4. Vodenska, I., **Using Interactive Synchronous Tablet Tools in Online Finance Courses,** *Third Instructional Innovation Conference, Boston University, March 2011*

5. Vodenska, I., Zhou, D., Havlin, S. and Stanley, H.E., **Model for Systemic Risk Propagation in Financial Networks**, *Latsis Symposium 2012, Economics on the Move, Trends and Challenges from the Natural Sciences, September 11-14, 2012, ETH Zurich, Switzerland*

6. Vodenska, I. and Chitkushev, L., **Web Portal for Financial Informatics Research and Education**, *8th Annual International Conference on Computer Science and Education, July 5-9, 2012, Boston, MA*

7. Vodenska, I., Zhou, D., Kenett, D., Havlin, S. and Stanley, H.E., **Distress Propagation in Coupled Foreign Exchange and Stock Market Networks,** *25th International Conference on Statistical Physics (StatPhys25), Seoul, S. Korea, July 22-26, 2013*

8. Vodenska, I., Dehmami, N., Battiston, S., Havlin, S. and Stanley, H.E., **Model of Financial Network Dynamics under Systemic Risk,** *10th European Conference on Complex Systems (ECCS'13), Barcelona, Spain, Sept. 16-20, 2013*

9. Piškorec, M., Antulov-Fantulin, N., Šmuc, T., Mozetič, I., Novak, P.K., Grčar, M., and Vodenska, I., **Quantifying the Impact of Cohesiveness in Financial News,** *10th European Conference on Complex Systems (ECCS'13), Barcelona, Spain, Sept. 16-20, 2013*

10. Vodenska, I., Dehmami, N., Battiston, S. and Stanley, H.E., **Systemic Risk Propagation from Troubled European Economies to Global Banks and Investment Funds,** *Workshop on Economic Science with Heterogeneous Interacting Agents (WEHIA), Reykjavik, Iceland, June 18-22, 2013*

11. Vodenska, I and Chambers, W., **Relation between VIX option-based implied volatility index and S&P 500 index volatility,** *26th Australasian Finance and Banking Conference (AFBC), Sydney, Australia, December 16-19, 2013*

12. Kenett, D.Y., Huang, X., Vodenska, I., Havlin, S., Stanley, H.E., **Partial Correlation Analysis of the Stock Market,** *Proc. of the 40th Annual Conference of the Eastern Economic Association, March 6-9, 2014, Boston, MA*

13. Joseph, A., Vodenska, I., Stanley, H.E., and Chen, G., (Poster Presentation), **MLR Fit-Network of Global Balance of Payments,** *10th International School and Conference on Network Science, June 2-6, 2014, University of California, Berkeley, CA*

14. Vodenska, I., Dehmamy, N., Mullokandov, A., Novak, P.K., and Mozetic, I., **Financial news sentiment structure and entity clustering,** *10th International School and Conference on Network Science, June 2-6, 2014, University of California, Berkeley, CA*

15. Dehmamy, N., Vodenska, I., Buldyrev, S., Havlin, S., and Stanley, H.E., (Poster Presentation) **A Dynamical Model of Systemic Risk in Bank-Asset Networks**, *10th International School and Conference on Network Science, June 2-6, 2014, University of California, Berkeley, CA*

16. Vodenska, I., Aoyama, H., Fujiwara, Y., Iyetomi, H., Arai, Y., **Interconnectivity between equity and foreign exchange markets,** *10th International School and Conference on Network Science, June 2-6, 2014, University of California, Berkeley, CA*

17. Chitkushev, L., Zlateva, T., Vodenska, I., Zlatev, V., **Analytics Dashboard Parameters for Digital Learning Management Systems,** *10th Annual International Conference on Computer Science and Education in Computer Science (CSECS 2014), July 4-7, 2014, Albena, Bulgaria*

18. Zhou, D., Vodenska, I., Kenett, D.Y., Stanley, H.E., Havlin, S., **Systemic Importance of Global Financial Markets and Distress Propagation,** *World Finance Conference, July 2-4, 2014, Ca'Foscari University, Venice, Italy*

19. Vodenska, I., **Lead-lag relationships in synchronization financial networks: Crisis vs. non-crisis period dynamics,** *International Workshop on Big Data and Macroeconomics, August 22-24, 2014, Grand Wailea, Maui, Hawaii*

20. Vodenska, I., Dehmamy, N., Mullokandov, A., Novak, P.K., and Mozetic, I., **Understanding the relationship between news analytics and financial time series,** *European Conference on Complex Systems (ECCS'14), September 22-26, 2014, Institute for Advanced Studies (IMT), Lucca, Italy*

21. Zhou, D., Vodenska, I., Kenett, D.Y., Stanley, H.E., Havlin, S., **Systemic importance of global financial markets and distress propagation**, *2014 Financial Management Association (FMA) Annual Meeting, October 15-18, 2014, Nashville, TN*

22. Aoyama, H., Vodenska, I., Fujiwara, Y., Iyetomi, H., Arai, Y., **Synchronization network of global foreign exchange and equity markets,** *Third International Workshop on Complex Networks and their Applications, November 23-27, 2014, Marrakech, Morocco*

23. Vodenska, I. and Runchev, N., **Real effective exchange rate and transitional economy of the Republic of Macedonia,** *World Finance and Banking Symposium, December 12-13, 2014, Singapore*

24. *Vodenska, I., Dehmamy, N., Buldyrev, S., Havlin, S., and Stanley, H.E.,* **Systemic stress test in shared portfolio network,** *International School and Conference on Network Science, January 14-16, 2015, Rio de Janeiro, Brazil*

25. *Vodenska, I., Curme, C., Stanley, H.E.,* **Can financial news sentiments predict stock market performance?,** *11th International Network Science Conference, June 1-5, 2015, Zaragoza, Spain*

26. *Vodenska, I., Curme, C., Stanley, H.E.,* **Bi-partite network approach to understanding essential predictors in news-markets coupled network,** *2nd Big Data in Economics, Science, and Technology Conference, July 20-22, 2015, Ohrid, Macedonia*

27. *Sakamoto, Y. and Vodenska, I,* **Dynamics of communities in multiplex synchronization networks,** *11th Econophysics Colloquium (EC2015), September 14-16, 2015, Institute for Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czech Republic*

28. *Vodenska, I., Becker, A., Zhou, D., Kenett, D., Stanley, H.E., Havlin, S.,* **Community analysis of global financial markets,** *Conference on Complex Systems (CCS'15), Sept 28 – Oct 2, 2015, Arizona State University, Tempe, AZ*

29. Curme, C., Stanley, H.E., Vodenska, I., **Coupled network approach to the predictability of financial market returns and news sentiments**, *Conference on Complex Systems (CCS'15), Sept 28 – Oct 2, 2015, Arizona State University, Tempe, AZ*

30. *Mullokandov, A., Dehmamy, N., Vodenska, I., Stanley, H.E., Mozetic, I., Kralj-Novak, P.,* **Empirically validated model of stock return dynamics**, *Conference on Complex Systems (CCS'15), Sept 28 – Oct 2, 2015, Arizona State University, Tempe, AZ*

31. *Curme, C. Stanley, H.E. and Vodenska, I.,* **Coupled Network Approach to Predictability of Financial Market Returns and News Sentiments,** *World Finance and Banking Symposium, December 17-18, 2015, Hanoi, Vietnam*

32. *Vodenska, I., H. Aoyama, Y. Fujiwara, H. Iyetomi, Y. Arai,* **Interdependencies and causalities in complex financial networks** (poster presentation), 2nd *International School and Conference on Network Science (NetSci-x), January 11-13, 2016, Wroclaw, Poland*

33. *Vodenska, I., Curme, C., Stanley, H.E.,* **Network - logistic regression approach to understanding the relationships between financial markets and social media–news sentiments,** *20th International Conference on Socio-economic systems with ICT and Networks, March 26-27, 2016, University of Tokyo, Japan*

34. *Wollschlager, M., Becker, A., Vodenska, I., Stanley, H.E., Schafer, R.,* **Currency classification and structural changes in foreign exchange markets,** *12th International Network Science Conference (NetSci'16), May 30-June 3, 2016, Seoul, S. Korea*

35. *Wollschlager, M., Becker, A., Vodenska, I., Stanley, H.E., Schafer, R.,* **Economic and Political influences in foreign exchange markets, 3**nd *Big Data in Economics, Science, and Technology Conference, July 20-22, 2016, Bali, Indonesia*

36. *Sakamoto, Y. and Vodenska, I.* **Cascading Failure Model and New Perspective on the 1990s Japanese Banking Crisis,** *Asia-Pacific Econophysics Conference, August 24-26, 2016, University of Tokyo, Japan*

37. *Sakamoto, Y. and Vodenska, I.* **Network approach to understanding the 1990s Japanese Financial Crisis,** *Conference on Complex Systems (CCS'16), September 19-22, 2016, Amsterdam, Netherlands*

38. *Vodenska, I., Aoyama, H., Fujiwara, Y., Iyetomi, I., and Arai, Y.* **Interdependencies and Causalities in Coupled Financial Networks,** *2016 Financial Management Association (FMA) Annual Meeting, October 19-22, 2016, Las Vegas, NV*

39. *Dehmamy, N., Byldirev, S., Havlin, S., Stanley, H.E., and Vodenska, I.* **A systemic stress test model in bank-asset networks,** *World Finance and Banking Symposium, December 14-15, 2016, Dubai, UAE*

40. Vodenska, I., Aoyama, H., Fujiwara, Y., Iyetomi, I., and Arai, Y. **Interdependencies and Causalities in Coupled Financial Networks,** *29th Australasian Finance, and Banking Conference (AFBC), Sydney, Australia, December 14-16, 2016*

41. Vodenska, I., Dehmamy, N., Buldyrev, S., Havlin, S., and Stanley, H.E., **Model for systemic risk propagation in shared portfolio networks**, 3nd *International School and Conference on Network Science (NetSci-x), January 15-18, 2017, Tel Aviv, Israel*

42. Vodenska, I., Dehmamy, N., Buldyrev, S., Havlin, S., and Stanley, H.E. **Systemic risk propagation in bank networks**, *Complex Network Conference - CompleNet '17, March 21-24, 2017, Dubrovnik, Croatia*

43. Vodenska, I., Aoyama, H., Fujiwara, Y., Iyetomi, H., and Lungu, E. **Sovereign Debt Network**, *The 21st meeting of the Japanese Association for Evolutionary Economics, Mar 26, 2017, Tokyo, Japan*

44. Wollschlager, M., Becker, A., Vodenska, I., Stanley, H.E., Schafer, R., **Economic and political effects on currency clustering dynamics**, *Seventh Annual Applied Finance Conference of the Financial Management Association, May 12, 2017, New York, NY*

45. Vodenska, I., Aoyama, H., Fujiwara, Y., Iyetomi, H., and Lungu, E., **Challenges in macroprudential regulation for bank network stability**, *The 22nd Annual Workshop on the Economic Science with Heterogeneous Interacting Agents (WEHIA), June 12-14, 2017, Università Cattolica del Sacro Cuore, Milan, Italy*

46. Vodenska, I., Aoyama, H., Fujiwara, Y., Iyetomi, H., and Lungu, E., **A network approach for macroprudential monitoring of systemic risk and bank stability,** *International School and Conference on Network Science, 2nd Workshop on Statistical Physics for Financial and Economic Networks, Jun 19, 2017, Indianapolis, IN*

47. Sakamoto, Y. and Vodenska, I., **Network approach to determining vulnerabilities of financial institutions** (poster presentation), *13th International Network Science Conference (NetSci'17), June 19-23, 2017, Indianapolis, IN*

48. Vodenska, I. **Using big data simulation as an early warning signal for global financial crises,** *Computer Science and Education in Computer Science (CSECS) 2017, Jun 30 – Jul 3, 2017, Albena, Bulgaria*

49. Vodenska I., **Modeling systemic risk and behavioral response in financial networks,** *5th International Conference on Big Data in Economics, Science and Technology, July 19-21, 2017, Phuket, Thailand*

50. Nishijima, M., Sarti, F.M., Vodenska, I., and Zhang, G., **Evaluating the primary healthcare decentralization on diabetes indicators: The case of Brazilian HiperDia program for diabetes,** *2017 Congress of the International Health Economics Association: Revolutions in the Economics of Health Systems, July 7-11, 2017, Boston, MA*

51. Becker, A., Wollschläger, M., Vodenska, I., and Stanley, H.E. **Macroprudential policymaking effects on currency clustering,** *Conference on Complex Systems (CCS'17), September 17-22, 2017, Cancun, Mexico*

52. Vodenska, I., Aoyama, H., Becker, A.P., Fujiwara, Y., and Iyetomi, H, **Systemic risk and vulnerabilities of bank networks**, *Second Conference on Network Models and Stress Testing for Financial Stability, September 26-27, 2017, Banco de Mexico, Mexico City, Mexico*

53. Vodenska, I. and Chitkushev, L., **Global investment networks and financial crises** (poster presentation), *Econopnysics-2017 & APEC-2017, November 15-18, 2017, Jawaharlal Nehru University and Delhi University, New Delhi, India*

54. Wallschlaeger, M., Becker, A., Vodenska, I., Stanley, H.E., and Schaefer, R., **Economic and political effects on currency clustering,** *World Finance and Banking Symposium, December 14-15, 2017, Bangkok, Thailand*

55. Sakamoto Y. and Vodenska I., **Network approach to determining vulnerabilities of financial institutions, (poster presentation),** *CompleNet '18, March 4-8, 2018, Boston, MA, USA*

56. Vodenska, I., Aoyama, H., Becker, A.P., Fujiwara, Y., and Iyetomi, H., **Systemic risk propagation and distress in bank networks,** *Financial Management Association (FMA) Asia/Pacific Conference, May 16-18, 2018, Hong Kong, HK*

57. Vodenska, I., Aoyama, H., Becker, A.P., Fujiwara, Y., and Iyetomi, H., **Systemic risk and vulnerabilities in bank networks,** *Financial Management Association (FMA) European Conference, June 13-15, 2018, Kristiansand, Norway*

58. Vodenska, I., Aoyama, H., Becker, A.P., Fujiwara, Y., and Iyetomi, H., **Network approach to understanding the fragility of financial systems,** Net-O-Nets Satellite, *14th International Network Science Conference (NetSci'18), June 11-15, 2018, Paris, France*

59. Vodenska, I. and Cai, W**., Impact of Federal Reserve announcements on major financial market sectors,** *The 6th Big Data in Economics, Science, and Technology (BEST) conference, July 12-14, 2018, Kallithea, Macedonia, Greece*

60. Vodenska, I., Aoyama, H., Becker, A.P., Fujiwara, Y., and Iyetomi, H., **Understanding the fragility of financial systems**, *World Finance Conference (WFC), July 25-27, 2018, Mauritius, Africa*

61. Vodenska, I., Aoyama, H., Becker, A.P., **Complex network approach to understanding and improving financial system stability,** 14th *Econophysics Colloquium, September 12-14, 2018, Palermo, Sicily, Italy*

62. Vodenska, I., Aoyama, H., Becker, A.P., **Macroprudential stress testing of global financial systems**, *Financial Management Association (FMA) Annual Meeting, October 10-13,2018, San Diego, CA, USA*

63. Souma, W. and Vodenska, I**., *Enhanced news sentiment analysis using deep learning methods,* PRIMA 2018: The 21st International Conference on Principles and Practice of Multi-Agent Systems, Oct 29 – Nov 2, 2018, Tokyo, Japan*

64. Vodenska, I., Aoyama, H., Becker, A.P., Fujiwara, Y., and Iyetomi, H., **Network approach to understanding vulnerabilities of financial systems**, *International School and Conference on Network Science, (NetSci-X 2019), January 3-5, 2019, Santiago, Chile*

65. Kremer, M., Becker, A., Vodenska, I., Stanley, H.E., and Schaefer, R*.,* **Currency stability and political and economic uncertainties,** *World Finance Conference (WFC), July 24-26, 2019, Santiago, Chile*

66. Vodenska, I., **Current trends and the future of fintech: Robo-advising fiduciary based on deep learning,** *The 7th Big Data in Economics, Science, and Technology (BEST) conference, July 5-7, 2019, Buenos Aires, Argentina*

67. Souma, W., Vodenska, I., and Chitkushev, L., **New measures of journal impact based on citation network,** *2019, 17th International Conference on Scientometrics and Informetrics, September 2-5, 2019, Sapienza University, Rome, Italy*

68. Vodenska, I., Mishev, K., Trajanov, D., and Chitkushev, L., **Forecasting financial and economic dynamics using artificial neural network and deep learning methodologies,** *Conference on Complex Systems (CCS'19), September 30-October 4, 2019, Nanyang Technological University, Singapore*

69. Souma, W., Vodenska, I., and Aoyama, H., **News sentiment analysis in the U.S. and Japan using deep learning methods,** *Conference on Complex Systems (CCS'19), September 30-October 4, 2019, Nanyang Technological University, Singapore*

70. Souma, W., Vodenska, I., and Chitkushev, L**., New Measure of Journal Impact based on the Number of Citations and PageRank,** *First International Conference on Science and Technology Metrics, December 2-4, 2019, Kasetsart University, Bangkok, Thailand*

71. Vodenska, I., Dehmamy, N., Becker, A., Buldyrev, S., Havlin, S. and Stanley, H.E., **Vulnerability of Interconnected Financial Networks***, International Conference on Network Science*, *NetSci-x 2020, January 20-23, 2020, Tokyo, Japan*

72. Davchev, J., Vodenska, I., Mishev, K., Chitkushev, L., and Trajanov, D., **Transfer learning methodology for Bitcoin price prediction based on financial micro-blogs,** *International Conference on Blockchain Applications, Blockchain in Kyoto 2020, February 27-28, 2020, Kyoto University, Kyoto, Japan*

73. Vodenska, I., Dehmamy, N., Becker, A., Buldyrev, S., Havlin, S. and Stanley, H.E., **Systemic Stress Test Model for Networks of Financial Institutions**, *11th International Conference on Complex Networks (CompleNet '20), Mar 31 – Apr 3, 2020, University of Exeter, United Kingdom*

74. Vodenska, I., Dehmamy, N., Becker, A., Buldyrev, S., Havlin, S. and Stanley, H.E., **Dynamic model for measuring the stability of financial systems**, *29th European Financial Management Association (EFMA) conference, June 24 – 27, 2020, University College Dublin, Dublin, Ireland*

75. Davchev, J., Mishev, K., Vodenska, I., Chitkushev, L., and Trajanov, D., **Forecasting Bitcoin Prices based on Financial Tweets**, *The 16th Annual International Conference on Computer Science and Education in Computer Science, Sept 5, 2020 (Virtual Conference)*

76. Prachiti, A., Zhang, G., Rawassizadeh, R., Vodenska, I., and Chitkushev, L., **Data Quality Assessment of Medical Insurance Claims,** *The 16th Annual International Conference on Computer Science and Education in Computer Science, Sept 5, 2020 (Virtual Conference)*

77. Vodenska, I., Dehmamy, N., Becker, A., Buldyrev, S., Havlin, S. and Stanley, H.E., **Bank systemic importance and fragility of financial networks,** *World Finance Conference (WFC), September 4-6, 2020, University of Malta, Malta*

78. Barlow, J and I. Vodenska, **Cascading failure in economic networks: The case of COVID-19,** *16th International Network Science Conference (NetSci'20), September 17-25, 2020, Rome, Italy*

79. Davchev, J., Mishev, K., Vodenska, I., Chitkushev, L., and Trajanov, D., **Financial Micro-blog network impact on cryptocurrency returns,** *16th International Network Science Conference (NetSci'20), September 17-25, 2020, Rome, Italy*

80. Becker, A., Garlaschelli, D., and Vodenska, I., **Systemic Risk Underestimation in Reconstructed Networks,** *16th International Network Science Conference (NetSci'20), September 17-25, 2020, Rome, Italy*

81. Zarkovic, M., Vodenska, I., Tomic, A., and Chitkushev, L., **Socio-economic determinants of growth in the European Union,** *World Finance and Banking Symposium, December 5-6, 2020, University of Latvia, Riga, Latvia*

82. Barlow, J. and Vodenska, I., **Modeling economic cascades due to a pandemic shock,** *Conference on Complex Systems (CCS2020), December 7-12, 2020, Aristotle University of Thessaloniki, Thessaloniki, Greece*

83. Davchev, J., Mishev, K., Vodenska, I., Chitkushev, L., and Trajanov, D. **Impact of Cryptocurrency tweet sentiments on crypto prices,** *Conference on Complex Systems (CCS2020), December 7-12, 2020, Aristotle University of Thessaloniki, Thessaloniki, Greece*

84. Barlow, J. and Vodenska, I., **Socio-economic impact of the Covid-19 Pandemic,** *33rd Australasian Finance and Banking Conference, December 15-17, 2020, Sydney, Australia*

85. Aras, P., Zhang, G., Lucas, M., Rawassizadeh, R., Vodenska, I., and Chitkushev, L., **Quality assessment of inpatient medical claim data (poster***), IEEE BIBM Online, December 16-19, 2020, Virtual Conference*

86. Julio, I., Becker, A.P., Vodenska, I., and Wang, Liyuan, **Corporate leverage ratio adjustment under cash flow-based debt covenants (poster)**, *American Economic Association (AEA), Allied Social Science Association (ASSA) Conference, January 3-5, 2021 (Virtual Conference)*

87. *Vodenska, I.,* **Transfer Learning Methodology for Bitcoin Price Prediction**, *Blockchain Conference (BCK21), Kyoto University, Kyoto, Japan, February 17-18, 2021*

88. Liu, C., Zhou, S., Vodenska, I., Chitkushev, L., Zhang, G., Gheitanchi, S., & Rawassizadeh, R. **Blockchain Technology in Healthcare: A Scientific and Technological Driving Force**, *34th IEEE Computer-Based Medical Systems (CBMS) Conference, June 7-9, 2021*

Invited talks

1. Vodenska, I., Wang, F.Z., Havlin, S. and Stanley, H.E**., Similarity of Investment Strategies and Global Financial Crisis,** *Perspectives and Challenges in Statistical Physics and Complex Systems for the Next Decade, November 9-11, 2011, Natal, Brazil*

2. Vodenska, I., Huang, X., Havlin, S. and Stanley, H.E., **Cascading Failures in Bi-partite Graphs: Model for Systemic Risk Propagation,** 8th *International Network Science (NetSci) Conference, June 18-22, 2012, Northwestern University, Evanston/Chicago, IL*

3. Vodenska, I., Dehmami, N., Havlin, S. and Stanley, H.E., **Complexity, and Dynamics of Financial and Economic Networks***, European Conference on Complex Systems (ECCS) 2012, COINET, September 2-7, 2012, Université Libre de Bruxelles, Brussels, Belgium*

4. Vodenska, I., Huang, X., Havlin, S. and Stanley, H.E., **Extreme events and boom-bust processes in complex financial and economic systems***, New Views on Extreme Events, ETH Risk Center Conference at Swiss Re, Zurich, Switzerland, October 25-26, 2012*

5. Vodenska, I., Dehmami, N. and Stanley, H.E., **Complexity and Systemic Risk Propagation in Global Economic Networks,** *FuturICT Conference at Media Lab, MIT, Cambridge, MA, February 13-14, 2013*

6. Vodenska, I., Dehmami, N., Havlin, S. and Stanley, H.E., **European Sovereign Debt of Greece, Spain, Italy, Ireland and Portugal (GIPSI) Effect on Global Financial Institutions,** 9th *International Network Science (NetSci) Conference, Copenhagen, Denmark, June 3-7, 2013*

7. Vodenska, I., Zhou, D., Havlin, S. and Stanley, H.E., **Cascading Failures in Institutional Investor Network caused by Systemically Important Banks,** *Complexity in Social Systems: From Data to Models, University of Cergy-Pontoise, Paris, France, June 27-28, 2013*

8. Vodenska, I. and Chitkushev, L., **Effects of European Sovereign Debt Crises on Global Financial Markets,** *Global Sustainable Finance Conference, Karlsruhe, Germany, July 4-5, 2013*

9. Vodenska, I., Zhou, D., Dehmami, N., Havlin, S. and Stanley, H.E., **Multiplex network interdependencies of currency markets and global stock market indices,** *Horizons in Social Sciences, IMT Lucca, Tuscany, Italy, July 9-11, 2013*

10. Vodenska, I., Aoyama, H., Fujiwara, Y., Zhou, D., Havlin, S. and Stanley*, H.E.* **Centrality Measures of Systemically Important Global Financial Markets: Eigenvector Approach,** *Financial Networks, and Systemic Risk Conference, Kyoto, Japan, July 17-19, 2013*

11. Vodenska, I., **Causes, and Consequences of the 2008 Global Financial Crisis**, *The Fifth Anniversary of the Global Financial Crisis of 2008, Federal Reserve Bank of Boston and Massachusetts Council for Economic Education, Boston FED, Boston, Oct 8., 2013*

12. Vodenska, I., **Global Financial Crises Effects on World Trade Relationships***, Conference on Evolution of International Trading System: Prospects and Challenges, St. Petersburg State University, School of Economics, St. Petersburg, Russia, Oct 31–Nov 1, 2013*

13. Vodenska, I., **Multiplex Financial Network Dependencies**, *5th Research Meeting of the Consortium for Systemic Risk Analytics (CSRA), Dec 12, 2013, MIT Sloan School of Management, Cambridge, MA*

14. Vodenska, I. **Data Analytics in Finance: Opportunities and Challenges,** *BU-IBM Data Analytics Symposium, Apr 30, 2014, Boston, MA*

15. Vodenska, I., Aoyama, H., Fujiwara, Y., Iyetomi, H., Arai, Y., Stanley, H.E., **Co-moving synchronization network: Model for global financial system dynamics**, *International Conference on Econophysics, May 31–Jun 2, 2014, East China University of Science and Technology, Shanghai, China*

16. Vodenska, I., **Interdependencies, and causalities in coupled financial networks,** *International Conference on Statistical Physics, July 7-11, 2014, Rhodes, Greece*

17. Vodenska, I., **Global stock markets and foreign exchange as coupled financial systems**, *European Conference on Complex Systems (ECCS'14), September 22-26, 2014, Institute for Advanced Studies (IMT), Lucca, Italy*

18. Vodenska, I. **Global Financial Crisis, and Social Networks,** *European University of the Republic of Macedonia (EURM), Oct 1, 2014, Skopje, Macedonia*

19. Vodenska, I. **Network Approach to Systemic Risk and System Response,** *Boston University School of Management (SMG) Research Seminar, Nov 5, 2014*

20. Vodenska, I., **A systemic stress test model in bank-asset networks**, *6th Research Meeting of the Consortium for Systemic Risk Analytics (CSRA), Dec 15, 2014, MIT Sloan School of Management, Cambridge, MA*

21. Vodenska, I., **Lead-Lag relationships in synchronization financial market coupled networks,** *Mar 16, 2015, Graduate School of Simulation Studies, University of Hyogo, Kobe, Japan*

22. Vodenska, I., **Complex Hilbert Principal Component Analysis of foreign exchange and stock market networks**, *Mar 17, 2015, Macroeconomic Workshop, University of Tokyo, Tokyo, Japan*

23. Vodenska, I., **Women in Science and Engineering: Opportunities and Challenges**, *Mar 19, 2015, Gender Equality Office, Niigata University, Niigata, Japan*

24. Vodenska, I., **Bi-partite network approach in constructing a recommender system for financial time series forecasting**, *May 27, 2015, Faculty of Computer Science and Engineering, Ss. Cyril and Methodius University, Skopje, Republic of Macedonia*

25. Vodenska, I., **Network approach to the predictability of news sentiments and financial markets,** *11th Econophysics Colloquium (EC2015), September 14-16, 2015, Institute for Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czech Republic*

26. Vodenska, I., **A systemic stress test model in bank-asset networks**, *Netconomics Satellite, Conference on Complex Systems (CCS'15), Sept 28 – Oct 2, 2015, Arizona State University, Tempe, AZ*

27. Vodenska, I. **Predictability of global financial markets using logistic regression and complex networks,** *ECONOPHYS-2015, International Workshop on "Econophysics and Sociophysics," November 27-December 1, 2015, New Delhi, India*

28. Vodenska, I. **Time correlation and news insights into Japanese and U.S. stock market dynamics**, *7th Research Meeting of the Consortium for Systemic Risk Analytics (CSRA), Dec 1, 2015, MIT Sloan School of Management, Cambridge, MA*

29. Vodenska, I., **High-frequency trading and flash crash challenges for regulators,** *Mar 7, 2016, College of Computer Science and Engineering, Ss. Cyril and Methodius University, Skopje, Republic of Macedonia*

30. Vodenska, I., **Investments and Risk Management***, Munich Business School (MBS) Master International Week, March 9-11, 2016, MBS, Munich, Germany*

31. Vodenska, I., **Innovation, and technology in financial markets***, Mar 14, 2016, Faculty of Organizational Sciences, University of Belgrade, Serbia*

32. Vodenska, I., **Economics and Politics of Financial Crises***, Mar 14, 2016, Fulbright Alumni Association - American Corner, Belgrade, Serbia*

33. Vodenska, I., **Model for systemic risk propagation in shared portfolio networks**, *May 15, 2017, Department of Physics, Kyoto University, Kyoto, Japan*

34. Vodenska, I., **Understanding bubbles, and global financial crises: Can we soften the systemic risk effect?** *May 25, 2017, Graduate School of Advanced Integrated Studies in Human Survivability, Kyoto University, Kyoto, Japan*

35. Vodenska, I., **Macroprudential stress testing of global financial institutions,** *Aug 23, 2017, Executive LLM in International Business Law, Boston University School of Law, Boston, MA*

36. Vodenska, I. **Macroprudential regulation and policy tools for monitoring global financial networks,** *Sept 19, 2017, Institute for Economics, Ss. Cyril and Methodius University, Skopje, Republic of Macedonia*

37. Vodenska, I. **Innovative modeling of cascading failures in global financial networks,** *September 18-23, 2017, 9th ICT Innovation Conference, Faculty of Computer Science and Engineering, Ss. Cyril and Methodius University, Skopje, Republic of Macedonia*

38. Vodenska, I., **Network-based modeling of systemic risk propagation in global financial systems,** *Joint International Econophysics Conference & Asia-Pacific Econophysics Conference, November 15-18, 2017, New Delhi, India*

39. Vodenska, I., **Complexity, and fragility of global financial systems***, May 23, 2018, College of Science and Technology, Nihon University, Tokyo, Japan*

40. Vodenska, I., **Modeling financial time series using deep learning neural networks,** *Network Science School and Conference (NetSci19) Statistical Physics of Financial and Economic Networks (SPFEN) Satellite, May 28, 2019, University of Vermont, Burlington, VT*

41. Vodenska, I., **Novel approach to forecasting corporate earnings using artificial intelligence,** *Jul 4, 2019, School of Management, University of San Andres, Buenos Aires, Argentina*

42. Vodenska, I., **Interdisciplinary approaches to modeling economic and financial systems,** *Sept 6, 2019, College of Computer Science and Engineering, Ss. Cyril and Methodius University, Skopje, Republic of North Macedonia*

43. Vodenska, I., **Forecasting business cycles and identifying significant economic events by using novel network methodologies,** 15th *Econophysics Colloquium, October 2-3, 2019, Nanyang Technological University, Singapore*

44. Vodenska, I., **Natural Language Processing and Deep Learning approach to forecasting corporate revenue,** *Complex Systems in Finance and Economics Workshop, Jan 17, 2020, Kyoto University, Kyoto, Japan*

45. Vodenska, I**., *(Plenary Invited Talk)* From the Global Financial Crisis of 2008 to Covid-19: Differences and Similarities,** *Tenth International Conference on Complex Systems, New England Complex Systems Institute (NECSI) Virtual Conference, Nashua, NH, July 27-31, 2020*

46. Vodenska, I**., *(Conference Invited Talk)* From Tulips to Raging Bulls: Financial Crises are Viral,** *School and Conference on Network Science (NetSci20) Complexity Meets Finance Workshop Satellite, September 17-25, 2020, Rome, Italy*

47. Vodenska, I., **Can artificial intelligence improve financial and economic forecasting?** *International Conference on Artificial Intelligence in Complex Socio-Economic Systems and Public Policy, Jindal Global University, India, January 20-22, 2021*

48. Vodenska, I., **A bird's-eye view into the origin of systemic risk: Financial Institutions, Sovereign Debt, and Public Health and Policy,** *Northwestern University, Institute on Complex Systems, January 27, 2021*