Filip-Mihai Toma, PhD

Researcher at the intersection of *Cognitive Science, Neuroeconomics, AI and Finance*

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Research profile

- Interdisciplinary researcher with ~**15 years of combined academic and industry experience** bridging **cognitive neuroscience, behavioral economics, artificial intelligence and finance**.
- 2.5 years as a Postdoctoral & Fulbright Scholar at **Caltech** , designing behavioral and neuroscience experiments on decision-making under risk and uncertainty.
- Built one of the first **passive brain–computer interaction** platforms to classify overconfidence and predict performance inside an experimentally induced asset-bubble market (3 peer-reviewed publications).
- Current agenda focuses on **human–AI interaction, cognitive digital twins, AI-assisted forecasting of financial bubble crashes, and preserving human agency** in a world of algorithmic decision-making.

Research interests

- Human–AI interaction via **passive brain–computer interfaces** (EEG, eye-tracking, biometrics)
- **Forecasting asset-bubble crashes** using neural, physiological and behavioral data
- Building **cognitive digital twins** for individual and collective decision-making
- **Maintaining agency** in AI-mediated decisions (finance, consumer, politics)
- **Supernormal stimuli** and the peak-shift effect on decisions in humans

Academic appointments

Lecturer (Associate Prof. equivalent), PhD

02/2025 – present

Bucharest University of Economic Studies — Bucharest Business School *Bucharest, Romania*

- Teaching: *Behavioral Economics & AI*; *Artificial Intelligence & Digital Transformation*; *Economics of Information.*
- Research: *1) Boom-and-bust dynamics with AI agents and behavioral biases*; 2) *Member of the AI for Energy Finance project, building an Energy Risk Finance Meter.*
- Awarded **ANIS national scholarship (5,000 EUR, Nov. 2025)** for integrating AI/ML concepts into an undergraduate course: *Business Decision-Making using ML.*

Fulbright & Postdoctoral Research Scholar

04/2022 – 04/2025

California Institute of Technology (Caltech) — Camerer & Shimojo labs *Pasadena, CA, USA*

- Designed and executed behavioral and neuroscience experiments on decision-making under risk and uncertainty.
- **Supernormal stimuli & peak-shift in humans** — psychophysics of preference intensification, with consumer, marketing, pricing and product-design implications.
- **Forecasting financial bubble crashes** using attention, emotion and biometric readouts; work under preparation for *Review of Financial Studies.*
- **Fulbright project (6 months)** — independently coordinated a research programme on mask-wearing reluctance during COVID-19 as social risk-taking, combining EEG and behavior.
- Teaching Assistant for **Brain, Mind and Society**, course held by Colin F. Camerer
- Completed the *Caltech Summer School in Data Science & AI* (July 2022).

Teaching Assistant
10/2013 – 10/2017

Bucharest University of Economic Studies — Finance & Banking — *Bucharest, Romania*

- Undergraduate: Financial Engineering; International Finance; Economics of Money, Banking & Financial Markets.
- Graduate (CEFIN MSc): Neuroeconomics, Financial Econometrics (Matlab, EViews), Risk Management, Fixed Income.

Industry & Policy Experience

(Senior) Model Manager, Sustainable Finance - ESG Scores
05/2024 – present

London Stock Exchange Group (LSEG) — *Bucharest, Romania*

- **End-to-end delivery** of ESG-related sustainable-finance models;
- Data-quality governance through variance checks on input/output pipelines.
- Cross-functional coordination with engineering, content operations, marketing and sales.

Expert Financial Risk Engineer & Data Science / AI Project Manager
04/2018 – 09/2021

Finastra — *Bucharest, Romania*

- Led the **AI team**: delivered NLP/ML models (Python, TensorFlow) that saved **300 man-hours/month**.
- Led the **Quantitative Risk Finance team**; main contact for RFR transition (SOFR, ESTR).
- Consulting and C++ investigations on curve construction, valuation, market and credit risk.

Economist - Financial Stability Division
09/2015 – 04/2018

National Bank of Romania — *Bucharest, Romania*

- Member, **ECB Internal Working Group** on structural macroprudential instruments.
- Identified other systemically important banks (O-SII) and calibrated the O-SII buffer for Romania.
- Supervised validation of internal credit and operational risk models for two largest Romanian banks ($>$ 2 bn. EUR in assets).
- Co-authored sections of the *Financial Stability Review* on financial markets dynamics.

Financial Markets Consultant
08/2013 – 10/2015

Misys International Financial Systems — *Bucharest, Romania*

- Front- and Middle-Office analytics consulting for major investment banks; VaR training delivery.
- Customer Advocate for Summit V5.7 rollout at a top global investment bank; C++ pricing/risk work.

Education

PhD in Finance (*Summa cum Laude*)
10/2013 – 07/2018

Bucharest University of Economic Studies — *Bucharest, Romania*

- Thesis: *The Neuroeconomics of Financial Markets.*
- Designed Romania's **first neurofinance experiment** on the neural correlates of bubble formation, and Romania's first **experimental dynamic-trading market**.
- Built an EEG + eye-tracking **human–computer interaction platform** for financial decision-making.

MSc in Finance & Banking (Erasmus: Université Paris Dauphine)
10/2011 – 05/2013

Bucharest University of Economic Studies — *Bucharest & Paris*

- Major: Econometrics — Time-Series Analysis & Risk Management.
- Thesis: *Estimating Market Risk Using an Asymmetric GARCH Model and Extreme Value Theory.*

BSc in Finance & Banking *10/2008 – 07/2011*
Bucharest University of Economic Studies *Bucharest, Romania*

- Major: Financial Engineering. Thesis grade: 93%.

Professional development & training

- **34th Workshop for EEGLAB**, University of California San Diego, November 2022.
- **Summer School in Data Science & Artificial Intelligence**, Caltech, July 2022.
- Machine Learning & Artificial Neural Networks, Udemy, April 2020.
- **FRM Level 1** — Financial Risk Manager, GARP, May 2019.
- **Shanghai Summer School in Neuroeconomics**, NYU Shanghai, July 2019.
- Risk Management & Financial Supervision, **Bank of England**, October 2017.
- Financial Risk Management, **Luxembourg School of Finance**, September 2016.
- **Frontiers in Neuroeconomics Summer School**, Heidelberg University, April 2014.

Selected peer-reviewed publications

1. Brodeur, Abel et al. (2026). Computational Reproducibility and Robustness of Empirical Economics and Political Science Research Between 2022 and 2023" I4R Discussion Paper Series 287, The Institute for Replication (I4R). *Nature*. [link]
2. **Toma, F.-M.**, Cepoi, C.O., Kubinschi, M. & Miyakoshi, M. (2023). Gazing through the bubble: an experimental investigation into financial risk-taking using eye-tracking. *Financial Innovation*. [link]
3. **Toma, F.-M.** (2023). A hybrid neuro-experimental decision support system to classify overconfidence and performance in a simulated bubble using a passive BCI. *Expert Systems with Applications*. [DOI]
4. **Toma, F.-M.** & Miyakoshi, M. (2021). Left Frontal EEG Power Responds to Stock Price Changes in a Simulated Asset Bubble Market. *Brain Sciences*, 11(6), 670. [DOI]
5. **Toma, F.-M.**, Cepoi, C. & Negrea, B. (2020). Does it pay off to be overconfident? Evidence from an emerging market — a quantile regression approach. *Finance Research Letters*. [DOI]
6. Negrea, B. & **Toma, F.-M.** (2017). Dynamic CAPM under ambiguity — an experimental approach. *Journal of Behavioral and Experimental Finance*. [DOI]
7. Cepoi, C.O. & **Toma, F.-M.** (2016). Estimating probability of informed trading on the Bucharest Stock Exchange. *Czech Journal of Economics and Finance (Finance-a-Uver)*, 66(2).
8. **Toma, F.-M.** & Kubinschi, M. (2017). Economic Sentiment Impact on Macroeconomic Dynamics in Emerging Market Economies. *Proceedings of the 29th IBIMA Conference*, Vienna.
9. **Toma, F.-M.**, Cepoi, C.O., Kubinschi, M. & Damian, V. (2017). High-Frequency Volatility Forecasting in Emerging Markets: A Comparative Approach. *Proceedings of the 29th IBIMA Conference*, Vienna.
10. **Toma, F.-M.** (2015). Behavioral biases of the investment decisions of Romanian investors on the Bucharest Stock Exchange. *Procedia Economics and Finance*.

Work in progress (in prep.)

1. Henning, T., Ross, S., **Toma, F.-M.**, Han, J., Ngo, C., Smith, A. & Camerer, C. — *Predicting Experimental Asset Bubble Returns using Machine Learning and Emotions* (in prep. for *Review of Financial Studies*).

2. **Toma, F.-M.**, Kang, Z., Tashjian, S., Shimojo, S., Mobbs, D. & Camerer, C. — *Supernormal stimuli and the peak-shift effect in humans.*

3. **Toma, F.-M.**, Krisst, L., Shehata, M., Wu, D.-W. & Shimojo, S. — *Wear a mask or get fined? Decision-making under risk and uncertainty using EEG and eye-tracking.*

4. **Toma, F.-M.**, Noguchi, M., Cole, E., Marks, M., Shehata, M., Wu, D.-W. & Shimojo, S. — *Neural networks vs. humans in assessing trademark similarities.*

5. Hyon, J., **Toma, F.-M.**, Shehata, M. — *RHYTHME: A Real-time HYperscanning pyTHon MEthod for EEG analyses.*

6. **Toma, F.-M.**, Dima, D.-M., Grecu, R., Pele, D. & Lessmann, S. — *Energy Risk Finance Meter — a benchmark for systemic risk in energy finance.*

7. Andrei, A., Velev, G., **Toma, F.-M.**, Pele, D. & Lessmann, S. — *Energy Price Modelling: A Comparative Evaluation of Four Generations of Forecasting Methods.*

Selected talks & conference presentations

- Visiting professor International Teaching Week at **BSP Business School**: *Managing Uncertainty: Human Decision-Making & Responsible AI in Business*, Hamburg, Germany, May 2026
- Visiting professor International Teaching Week at **INSEEC Business School**: *Managing Uncertainty: Human Decision-Making & Responsible AI in Business*, Bordeaux & Lyon, France, Mar. 2026
- Editor and reviewer for **Data science and behavioral economics** section of the ICBE (International Conference on Business Excellence) conference, organized by FABIZ, Bucharest University of Economic Studies
- **ERMAS - Annual Scientific Conference of Romanian Academic Economists from Abroad**, Iasi, Romania - *Predicting Experimental Asset Bubble Returns using Machine Learning and Emotions*, Aug. 2025
- **Society for Neuroeconomics**, Vancouver, Canada — *Supernormal stimuli and the peak-shift effect in humans*, Oct. 2023.
- San Diego, California **Western Economic Association International**
- **International Conference in Experimental Finance**, Sofia, Bulgaria — *Supernormal stimuli and finance applications*, June 2023.
- Caltech Neuroeconomics Lab meetings (Camerer lab), multiple, 2022–2024.

Teaching

- **Graduate / Executive** — Behavioral Economics & AI; Artificial Intelligence & Digital Transformation; Economics of Information. (Bucharest Business School, 2024–)
- **Undergraduate** — Business Decision-Making using ML; Financial Engineering; International Finance; Economics of Money, Banking & Financial Markets (FABIZ & Finance and Banking faculty)
- **Graduate guest lectures** — Neuroeconomics; Financial Econometrics; Risk Management; Fixed-Income Financial Instruments (CEFIN MSc Program, 2013–2017).

Grants, scholarships & honors

- **ANIS Romania** scholarship (5,000 EUR) — Integrating AI/ML in Teaching, Nov 2025.
- **Fulbright Scholar Award** — Caltech, 2022 (6-month independently-run research project).
- **Caltech Postdoc in Decision Neuroscience Fellowship**, 2022–2024 - Supernormal stimuli
- PhD awarded ***Summa cum Laude***, 2018.
- CAE — Cambridge Advanced English (2007); National French Olympics finalist (2007); County English Olympics — 1st place (2008).

Skills

Programming	Python (>7 yrs, incl. TensorFlow, PyTorch, scikit-learn); C++, Java (working-level); SQL.
Scientific / Stats	Matlab, R, SPSS, Stata, EViews, Gauss.
Neuro / Behavioral	PsychoPy, EEGLAB, eye-tracking pipelines, biometric data analysis, passive BCI design.
Experimental	Behavioral experiment design; fMRI/EEG/eye-tracking preprocessing; psychophysics.
Finance / Quant	Risk models (VaR, EVT, GARCH), curve construction, ESG methodology, RFR (SOFR/ESTR).
Project / Product	Agile, Jira, Salesforce; AI team & quant team leadership; stakeholder management.
Languages	Romanian (native); English (bilingual, CAE); French (advanced); Spanish (beginner).

References

Available on request. Prior advisors / collaborators include faculty at Caltech, Bucharest University of Economic Studies, NYU Shanghai and the National Bank of Romania.