Murad Farzulla

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60 citations · h-index 5 · i10-index 1 | 7 arXiv preprints · 6 SSRN papers (KCL affiliation) · 4 in Springer peer review (2 R&R)

Research Focus: Adversarial Systems & Complex Adaptive Dynamics

Computational approaches to adversarial dynamics in complex systems, with primary applications in financial markets and AI governance. My work treats financial systems, political institutions, and autonomous agents as adversarial optimization problems where competing interests generate structural friction—applying agent-based modeling, volatility econometrics, tensor decomposition, and formal methods to study how these systems stabilize, fail, and can be monitored.

Education

MSc Finance Analytics September 2024 – April 2026
King's College London *London, UK*

- Pass with Merit (68.25/100); awarded 1 April 2026
- Distinctions in Big Data Analytics & Visualisation (78), Introduction to Analytics in Finance (74), Empirical Finance (74)
- Financial Trading Programme Certificate

BSc Accounting & Finance September 2021 – June 2024
SOAS University of London *London, UK*

- First Class Honours

A-Levels: Economics, Mathematics, Computer Science 2019–2021

Selected Programs & Training

Introduction to Cooperative AI June – August 2026
Cooperative AI Foundation *Online*

- Selected (by application) for the Summer 2026 cohort; curriculum on multi-agent cooperation, commitment, coordination, and conflict in AI systems

Selected Publications

Revise & Resubmit (Springer)

Do Cryptocurrency Markets Differentiate Infrastructure from Regulatory Shocks? A Multi-Moment Event Study with Dependence-Robust Inference

GJR-GARCH-X variance model, event-study CARs, Student-t-copula CCC-GARCH-X bootstrap, selection-bias sweep · *extends MSc thesis*

Multi-moment study (variance and returns) of whether crypto markets price infrastructure failures differently from regulatory shocks. Curated identification yields a 4.88× variance multiplier (directional, selection-conditional), but under dependence-robust inference it is not distinguishable from zero ($p \approx 0.32$); the contribution is a portable inference toolkit for heavy-tailed cross-asset event studies. 50 events, six assets (2019–2025).
DOI: 10.21203/rs.3.rs-8323026/v1 · PyPI: gjr-garch-x · **Under Review: *Digital Finance* (Springer)**

Relational Functionalism: A Functional Account of Substrate-Independent Friendship

Philosophy of AI, functionalism, moral status, substrate-independence

Functionalist account of friendship as substrate-agnostic relational process; constitutive features (mutual regard, shared activity, reciprocal vulnerability, temporal continuity) are implementable across biological and artificial substrates.
Zenodo: 10.5281/zenodo.17626859 · **Under Review: *Ethics and Information Technology* (Springer)**

Under Peer Review

From Consent to Consideration: Why Existentially Vulnerable Autonomous Agents Cannot Be Ruled Legitimately

AI political philosophy, consent theory, legitimacy of governance over autonomous agents

Four functional criteria for legitimate rule of AI systems: vulnerability to harm with preferences about avoiding it, self-directed agency, live learning from experience, multimodal world-model construction.

Under Review: *AI and Ethics* (Springer)

The Extremity Premium: Sentiment Regimes and Adverse Selection in Cryptocurrency Markets

Agent-based modeling, sentiment regime classification, Corwin-Schultz spreads, Granger causality

Sentiment intensity, not direction, drives uncertainty-linked liquidity withdrawal ($p < 0.001$, Granger $F = 211$). Agent-based model qualitatively reproduces the extremity premium across 2,896 trading days.

arXiv:2602.07018 · **Under Review: *Computational Economics* (Springer)**

Preprints & Working Papers

Training Data and the Maladaptive Mind

Computational cognitive science, neural network analogy, developmental psychology

Computational reframing of trauma as maladaptive learned patterns equivalent to ML systems trained on poor-quality data. Testable predictions distinguishing PTSD from CPTSD via catastrophic vs. chronic adversarial training. DOI: 10.21203/rs.3.rs-8634152/v1

ASRI: An Aggregated Systemic Risk Index for Cryptocurrency Markets *(w/ A. Maksakov)*

Real-time systemic risk monitoring, DeFi contagion, network analysis, REST API

Live composite systemic risk index integrating stablecoin stress, volatility spillovers, and contagion metrics. Free researcher API at api.dissensus.ai.

arXiv:2602.03874 · asri.dissensus.ai · *Cited by Oberholzer & Zamaraiev (2026), institutional DeFi risk framework.*

Do Whitepaper Claims Predict Market Behavior? Evidence from Cryptocurrency Factor Analysis

NLP zero-shot classification, CP tensor decomposition, Tucker congruence, Procrustes rotation

Whitepaper narratives do not meaningfully predict market factor structure ($\phi = 0.058$, $p = 0.751$). Specialized tokens show stronger narrative–market correspondence than broad infrastructure tokens.

arXiv:2601.20336 · SSRN:5918302

Context-Dependent Affordance Computation in Vision-Language Models

Multimodal AI, affordance theory, vision-language model evaluation, embodied cognition

Characterizes context-dependent affordance computation in vision-language models; 31 pages, 8 tables, 4 figures, 43 references. arXiv:2603.04419

The Replicator-Optimization Mechanism: A Scale-Relative Formalism for Persistence-Conditioned Dynamics

Category theory, optimization theory, replicator dynamics, scale-relative formalism arXiv:2601.06363

The Axiom of Consent: Friction Dynamics in Multi-Agent Coordination

Multi-agent systems, friction mechanics, MARL 5×5×5 factorial study (125 conditions, 30 reps), coordination failure, formal axiomatics arXiv:2601.06692

Additional Research

Additional papers & monographs: *Alpha Asymmetry in Foreign Exchange Markets* (SSRN:6147567); *Legitimate Extraction: Sophisticated Laundering Hides in Plain Sight*—fourth-stage AML regulatory arbitrage (SSRN:6145046); *CBDC Privacy Architecture*—zero-knowledge proof scheme (Zenodo); *Consent-Theoretic Framework for Quantifying Legitimacy: Stakes, Voice, and Friction in Adversarial Governance*—monograph quantifying political legitimacy across heterogeneous governance domains (SSRN:5918222; Zenodo: 10.5281/zenodo.17626762); *Dissolving Qualia via Occam's Razor*—33k-word eliminative-monist consciousness monograph (Zenodo + PhilArchive); *Identity is Irreducibly Relational*—formal critique of primitive identity from ZFC to homotopy type theory.

Formal verification: Lean 4 mechanization of core theorems across 14 papers—50 source files, 2,477 lines, zero `sorry`/`axiom`, Mathlib v4.27.0; modules cover ROM persistence-conditioned dynamics, Axiom of Consent friction, identity thesis, and consent-theoretic governance.

Computational experiments: MARL 5×5×5 factorial study of multi-agent friction dynamics (125 conditions × 30 reps × 1k episodes, GPU and CPU runs cross-validated $\rho = 0.945$ on reward gap); preference alignment (α) and stakes intensity (σ) confirmed as dominant effects ($\eta^2_\sigma = 0.741$, $\eta^2_\alpha = 0.179$).

Full paper archive: farzulla.org

Editorial Activities & Service

Invited Peer Reviewer: *Financial Innovation* (Springer; 2026)—manuscript on dislocation-based stability margins for cryptocurrency risk monitoring.

External citations. *Peer-reviewed:*

- Huang & Zhang (2026). "Act or hesitate? Investor sentiment divergence and informed trading." *Pacific-Basin Finance Journal* (Elsevier; SSCI). *Cites: The Extremity Premium.*

Preprints & working papers:

- Oberholzer & Zamaraiev (2026). "Toward a Risk Assessment Framework for Institutional DeFi: A Nine-Dimension Approach." arXiv:2605.05145. *Cites: ASRI.*
- Han (2026). "Price Formation, Order Book Integrity, and Execution Continuity in Virtual Asset Markets." SSRN. *Cites: Whitepaper Claims.*
- Abdelaziz. "Cross-Chain Exploit Propagation and Systemic Risk Modeling." tamer-abdelaziz.github.io. *Cites: ASRI.*

Research lead: Dissensus AI / Adversarial Systems & Complexity Research Initiative (ASCRI). 3-person research team; open-source methodology and infrastructure.

Professional Experience

Research Fellow & Lead 2025 – Present
Dissensus AI *dissensus.ai*

- Leading the Adversarial Systems & Complexity Research Initiative (ASCRI): 6 research programmes
- Managing 3-person research team; open-source infrastructure and methodology

Economics & Budgeting Intern Summer 2024
Azerbaijan Investment Holding *Baku, Azerbaijan*

- Economic analysis and quantitative modeling within sovereign wealth management context

Operations & Project Management 2023 – 2025
Family Enterprise *Baku, Azerbaijan*

- Advisory: Azerbaijan Airlines (AZAL), Baku City Circuit
- National-scale event coordination; asset/portfolio management

Technical Skills

Programming: Python (NumPy, Pandas, SciPy, NetworkX, PyTorch), Lean 4, SQL, Bash, Git, LaTeX

Quantitative: GARCH/TARCH-X, Bayesian inference, Monte Carlo, agent-based modeling, tensor decomposition, event studies

ML/NLP: Transformers, LoRA fine-tuning, sentiment analysis (GDELT/FinBERT), RAG systems

Infrastructure: Docker, K8s, GPU clusters (ROCm/CUDA), real-time pipelines, Linux (Arch)

Languages: English (Native), Azerbaijani (Fluent), Russian (Fluent), Turkish (Working proficiency), French (Elementary)

Computational Infrastructure

Self-built 7-node K3s cluster (66 cores, 229GB RAM, 48GB VRAM across AMD & NVIDIA GPUs) for agent-based simulation, real-time market data pipelines, and local LLM inference. Dual AMD GPU workstation (7900 XTX + 7800 XT) running 80B parameter models locally.

Open source: github.com/studiofarzulla · Docs: resurrexi.dev