

Anna Maddux

Research Profile

Applied mathematician using game theory to study how an authority can learn to set prices, taxes, or subsidies when firms' responses are unknown, with applications to energy and transportation. At the BIS Monetary and Economic Department, estimated GDP effects of trade-cost shocks in an input-output model and measured supply-chain disruptions from earnings calls.

Education

Graduate coursework (audit) at Yale University (New Haven, USA) Fall 2026
International Trade I; Mathematical Economics: General Equilibrium Theory

École Polytechnique Fédérale de Lausanne (EPFL) (Lausanne, Switzerland) | PhD in Applied Mathematics Feb 2022 – May 2026
Supervisor: Maryam Kamgarpour (Sycamore Lab)

- Thesis: "Game-Theoretic Decision Making in Multi-Agent Systems under Constraints and Welfare Objectives"
- Committee: Galit Ashkenazi-Golan, Nicolò Cesa-Bianchi, Giancarlo Ferrari Trecate (President), Heinrich Nax

MIT (Cambridge, USA) | Visiting Fellow Apr 2025 – Jun 2025
Supervisor: Gabriele Farina (Laboratory for Information and Decision Systems)

- Investigated equilibrium selection mechanisms to resolve coordination failures among independent agents.

ETH Zürich (Zürich, Switzerland) | M.Sc. in Statistics Sep 2019 – May 2021
Supervisors: Fadoua Balabdaoui, Giuseppe Belgioioso, Florian Dörfler, Nicolò Pagan

- Thesis: "Behaviour Estimation in Dynamic Games"; selected coursework: Time Series Analysis

University of Freiburg (Freiburg, Germany) | B.Sc. in Mathematics Oct 2015 – Mar 2019
• Thesis: "Symmetric Random Walks and a Generalization of the Borel-Cantelli Lemma"

University of Freiburg (Freiburg, Germany) | B.Sc. in Economics Oct 2013 – Feb 2019
• Thesis: "Hyperparameter Optimization of Neural Networks: Grid Search versus Random Search"
• Selected coursework: Econometrics, Macroeconomics, Money and Credit, Microeconomics

Job Market Paper

Learning Policy Interventions in Strategic Markets
Nikolas Geroliminis, Maryam Kamgarpour, Anna Maddux, and Marko Maljkovic.
Working paper, 2026.

Abstract. An authority choosing prices, taxes, or subsidies may know its policy objective without knowing how competing firms will respond. Successive interventions reveal performance, but incomplete firm adjustment can systematically distort these observations. We study this problem in repeated Stackelberg games. For a specified scalar objective, the authority learns the map from interventions to equilibrium performance directly from numerical feedback. We then extend the method to an analyst who observes several outcomes and pairwise judgments from an evaluator with an unknown fixed linear trade-off. Under explicit game, function-class, feedback, and response-accuracy assumptions, we bound cumulative performance loss and give rules for recommending an intervention together with a firm response that leaves limited incentives to deviate. Stylized charging-price and carbon-policy studies illustrate the two regimes.

Combines and extends "No-Regret Learning in Stackelberg Games with an Application to Electric Ride-Hailing" (CDC 2025) and "Learning Stackelberg Equilibria from Preferences over Unknown Multi-Objective Trade-offs" (under review, ICLR).

Research and Professional Experience

Bank for International Settlements (BIS) | Technical Advisor May 2026 – Aug 2026
Monetary and Economic Department (MED); full-time

- Adapted the multi-country, multi-sector model of Baqaee and Farhi (2024) to 2022 OECD input-output tables to estimate short- and long-run GDP effects of trade-cost shocks; sector-specific shocks were far less damaging than global ones.
- Used an LLM to build a firm-level dataset on supply-chain disruptions and firms' inventory and pricing responses from 400,000 earnings call transcripts; its disruption measure closely tracked the New York Fed's Global Supply Chain Pressure Index, and exploratory analysis informed the team's regressions comparing firms with and without inventory buffers.
- Coauthored BIS Bulletin No. 138 and a note on supply-chain chokepoints for the September 2026 Global Economy Meeting of central bank Governors; briefed the BIS Heads of Central Bank Cooperation and of Macroeconomic Analysis.

ETH Zürich | Research Assistant
Computational Social Science (COSS) Group, Oct 2021 – Dec 2021; part-time
Automatic Control Laboratory (IfA), May 2021 – Jul 2021; part-time

May 2021 – Dec 2021

Daimler AG, Stuttgart | Data Science Intern
Advanced Analytics and Big Data Group; full-time

Apr 2019 – Aug 2019

German Bundestag, Berlin | Research Intern
Dr. Christoph Hoffmann, MdB, Economic Cooperation and Development Committee; full-time

Jan 2019 – Feb 2019

Publications and Working Papers

* Equal contribution. + Mentored student.

Peer-Reviewed Journal Publications

Finite-time convergence to an ϵ -efficient Nash equilibrium in potential games

Anna Maddux^{*}, Reda Ouhamma^{*}, Hana Catic⁺, and Maryam Kamgarpour.
IEEE Transactions on Control of Network Systems (TCNS), 2026.

Policy Publications

Chokepoint disruptions and their macroeconomic consequences

Ibrahim Alshehri, Ryan Banerjee, Michael Chui, Anna Maddux, Ko Munakata, and Fabrizio Zampolli.
BIS Bulletin, No. 138, 2026.

Peer-Reviewed Conference and Workshop Publications

Preference-Based Distributed Welfare Maximization: A Game-Theoretic Approach

Antoine Bergerault⁺, Anna Maddux, Andreas Schlaginhausen, and Maryam Kamgarpour.
International Conference on Machine Learning (ICML) Workshop, 2026.

Eliciting Truthful Feedback for Preference-Based Learning via the VCG Mechanism

Leo Landolt⁺, Anna Maddux, Andreas Schlaginhausen, Saurabh Vaishampayan, and Maryam Kamgarpour.
Artificial Intelligence and Statistics Conference (AISTATS), 2026.

No-Regret Learning in Stackelberg Games with an Application to Electric Ride-Hailing

Anna Maddux^{*}, Marko Maljkovic^{*}, Nikolas Geroliminis, and Maryam Kamgarpour.
IEEE Conference on Decision and Control (CDC), 2025.

Multi-Agent Learning in Contextual Games under Unknown Constraints

Anna Maddux and Maryam Kamgarpour.
Artificial Intelligence and Statistics Conference (AISTATS), 2024.

Reinforcement learning for scaffold-free construction of spanning structures

Gabriel Vallat⁺, Jingwen Wang, Anna Maddux, Maryam Kamgarpour, and Stefana Parascho.
ACM Symposium on Computational Fabrication (ACM SCF), 2023.

Data-driven behaviour estimation in parametric games

Anna Maddux, Nicolò Pagan, Giuseppe Belgioioso, and Florian Dörfler.
International Federation of Automatic Control (IFAC), 2023.

Working Papers

Learning Stackelberg Equilibria from Preferences over Unknown Multi-Objective Trade-offs

Marko Maljkovic, Anna Maddux, Maryam Kamgarpour, and Nikolas Geroliminis.
Under review, International Conference on Learning Representations (ICLR).

Seminars and Conference Presentations

IEEE Conference on Decision and Control

Conference talk; Rio de Janeiro, Brazil.

Dec 2025

NCCR Phase II, ETH Zürich

Poster presentation; Zürich, Switzerland.

Nov 2025

PhD seminar, Université de Lorraine Invited talk; Metz, France.	Nov 2024
Workshop on Learning in Games, Institut de Mathématiques de Toulouse Poster presentation; Toulouse, France.	Jul 2024
Artificial Intelligence and Statistics Conference (AISTATS) Poster presentation; Valencia, Spain.	May 2024
PhD seminar, EPFL Seminar talk; Lausanne, Switzerland.	Oct 2023

Teaching Experience and Supervision

University Courses (Teaching Assistant)

Foundations of Artificial Intelligence	EPFL	Fall 2022–2025
Multi-Agent Learning and Control	EPFL	Spring 2024
Analysis 2	ETH Zürich	Spring 2020
Microeconomics 1 (Fall 2015, 2016) and 2 (Spring 2016)	University of Freiburg	2015–2016

Student Supervision (EPFL, Lausanne)

Semih Zaman , Semester project Competitive Multi-agent RL with Coupling Constraints. <i>Co-supervision with Philip Jordan and Maryam Kamgarpour.</i>	Sep 2025 – Jan 2026
Leo Landolt , Master's thesis VCG mechanism for truthful demand response via preference feedback. <i>Co-supervision with Andreas Schlaginhaufen, Saurabh Vaishampayan, and Maryam Kamgarpour.</i>	Jan 2025 – Aug 2025
Hana Catic , Semester project Finite time convergence to an ϵ -efficient Nash equilibrium in potential games. <i>Co-supervision with Reda Ouhamma and Maryam Kamgarpour.</i>	Sep 2024 – Jan 2025
Antoine Bergerault , Semester project Learning to maximize the social welfare from preference feedback. <i>Co-supervision with Andreas Schlaginhaufen and Maryam Kamgarpour.</i>	Feb 2024 – Jun 2024
César Camus-Emschwiller , Semester project Learning in potential games with coupling constraints - Practical application. <i>Co-supervision with Gabriel Vallat and Maryam Kamgarpour.</i>	Feb 2024 – Jun 2024
Julien Drouet , Semester project Learning in Potential Games with Coupling Constraints. <i>Co-supervision with Gabriel Vallat and Maryam Kamgarpour.</i>	Feb 2024 – Jun 2024
Sabri El Amrani , Semester project Reinforcement Learning from Human Feedback for the Construction of Spanning Structures. <i>Co-supervision with Andreas Schlaginhaufen and Maryam Kamgarpour.</i>	Sep 2023 – Jan 2024
Dana Afazeli , E3 summer internship <i>Co-supervision with Kai Ren and Maryam Kamgarpour.</i>	Jun 2023 – Sep 2023
Titouan Renard , Master's thesis Provable Convergence Guarantees for Constrained Inverse Reinforcement Learning. <i>Co-supervision with Andreas Schlaginhaufen, Tingting Ni, and Maryam Kamgarpour.</i>	Feb 2023 – Jul 2023
Riccardo Ruzza , Bachelor project <i>Co-supervision with Giulio Salizzoni and Maryam Kamgarpour.</i>	Feb 2023 – Jun 2023
Julien Gouraud , Bachelor project <i>Co-supervision with Giulio Salizzoni and Maryam Kamgarpour.</i>	Feb 2023 – Jun 2023
Gabriel Vallat , Master's thesis Reinforcement learning for scaffold-free construction of spanning structures. <i>Co-supervision with Maryam Kamgarpour and Stefana Parascho.</i>	Sep 2022 – Jan 2023

Science Education and Outreach

Swiss TecDays: “Mathematics of the cities of the future”

Oct 2024 – Nov 2025

Presentations for high-school students at the following schools in Switzerland: Kantonsschule Hohe Promenade, Zürich (Nov 2025); Gymnasium Neufeld, Bern (Mar 2025); Kantonsschule Reussbühl (Nov 2024); Kantonsschule Wohlen (Oct 2024).

NCCR Automation: “A researcher in my class”

Feb 2024

Presentation at Kantonsschule Beromünster, Beromünster, Switzerland.

Academic Service

Peer Review

International Conference on Learning Representations (ICLR); International Conference on Machine Learning (ICML) Workshop; Conference on Artificial Intelligence and Statistics (AISTATS); International Federation of Automatic Control (IFAC); European Control Conference (ECC); IEEE Conference on Decision and Control (CDC).

Conference and Workshop Organization

Workshop Organizer | National Centre of Competence in Research (NCCR) Automation junior retreat

Apr 2024

Beatenberg, Switzerland. Led the Entrepreneurship and Innovation workshop, developing content and inviting speakers.

Fellowships and Awards

Accenture Female Talent Program

Mar 2020 – Oct 2020

Mentoring program for women in STEM and economics.

Fellow, Friedrich Naumann Foundation for Freedom

2017 – 2022

Academic scholarship (awarded to 1% of German university students).

References

Maryam Kamgarpour

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