

Ulrich D. S. AIOUNOU

PhD student in Econometrics and Machine Learning
Aix Marseille School of Economics

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LinkedIn



GitHub



Kaggle

Summary

I am a PhD student in Econometrics and Machine Learning at Aix-Marseille University. My research focuses on the intersection of econometrics and machine learning, with a particular interest in causal inference, high-dimensional data analysis, and time series modeling. I am passionate about developing innovative methods that can be applied to real-world economic problems and teaching is one of my favorite activities.

Research interests

Econometrics Machine Learning Causal Machine Learning High-Dimensional Time Series Analysis
Natural Language Processing AI engineering Data Science

Education

- | | | |
|---------------------|---|-------------------|
| Sep 2022 – Dec 2026 | 📖 PhD in progress (<i>defense planned December 2026</i>) | Marseille, France |
| | <i>Thesis title: Essays in Modern Econometrics: Variable Selection, Time Series and Machine Learning</i> | |
| | Aix Marseille School of Economics (AMSE) | |
| | <ul style="list-style-type: none">• Machine learning & Variable selection in high dimensions.• Advanced econometrics.• Time Series, Long memory and Spectral analysis.• NLP and forecasting. | |
| Sep 2020 – Jun 2022 | 📖 Big data economist engineer | Marseille, France |
| | <i>Thesis title: Variable selection in high dimension: Autometrics vs Lasso</i> | |
| | Aix Marseille School of Economics (AMSE) | |
| | <ul style="list-style-type: none">• Research Methodology.• Big data & Programming.• Advanced Econometrics & Machine learning.• Economics. | |
| Nov 2014 – Dec 2017 | 📖 Bachelor's degree in Statistics | Cotonou, Bénin |
| | <i>Thesis title: Determinants of choice of contraceptive methods in Benin</i> | |
| | National School of Applied Economics and Management (ENEAM) | |
| | <ul style="list-style-type: none">• Data Mining and Analysis.• Probability, Descriptive and Inferential Statistics.• Linear Algebra & Mathematical Analysis. | |
| Nov 2015 – Nov 2016 | 📖 Advanced Technician's Certificate in Business Information Systems | Cotonou, Bénin |
| | <i>Thesis title: Building of application for hotel management: case of Hôtel Terra Nostra</i> | |
| | Sainte Felicity High School | |
| | <ul style="list-style-type: none">• Database by Merise.• Database management and administration.• Programming. | |

Working papers and research in progress

- 2025  **When Is News Really News? Evidence from Cryptocurrency Markets**
 Ulrich D. S. AIOUNOU. *Work in progress.*
Abstract. This chapter examines whether news sentiment provides additional predictive information for cryptocurrency returns and volatility beyond that contained in market variables. I use asset-specific news headlines collected from GDELT to construct two daily sentiment measures based on a financial lexicon and FinBERT. The analysis covers Bitcoin, Ether, Solana, and XRP, with multiple forecast horizons. Seven forecasting models are considered, including linear regressions, tree-based methods, and a neural network. Forecasting performance is evaluated using an expanding-window approach, with RMSE comparisons and the Clark-West test. I consider both a common sample and asset-native samples to examine the sensitivity of the results to the sample design. The analysis also examines whether the predictive contribution of sentiment differs between high- and low-volatility market conditions. The results indicate that news sentiment provides more favorable improvements for volatility forecasting than for returns. Statistically supported return gains are relatively limited and rarely persist across the two sample designs. In contrast, several volatility forecasts benefit from sentiment information, with the largest improvements generally obtained using Multilayer Perceptron (MLP), particularly for XRP. However, some of these gains weaken or reverse when different sample periods are considered. The results also show that improvements occur under different market volatility conditions, without a consistent advantage for either regime.
- 2024  **A regime switching Gegenbauer model of unemployment rates in the G7 countries**
 Ulrich D. S. AIOUNOU,  Gilles Dufrénot. *Work in progress.*
Abstract. We propose a regime-switching smooth transition autoregressive model built on a two-factor Gegenbauer process (RSG-STAR) to study unemployment dynamics in the G7 countries. The framework jointly captures long memory at cyclical frequencies, anti-persistent volatility, and asymmetric state-dependent adjustment. A feasible alternating nonlinear least-squares estimator and a dedicated linearity test are developed. The linearity test rejects a linear Gegenbauer null at the 1% level for all seven countries, with the rejection reflecting both STAR nonlinearity and inadequacy of the linear memory specification. Generalised impulse response functions show that regime switching amplifies long-memory persistence in Canada and France, moderates it in Germany and Japan, and produces explosive trajectories in the United Kingdom and the United States, with direct implications for the design of stabilisation policy.
- 2023  **Estimation in high-dimensional linear regression: Post-Double-Autometrics as an alternative to Post-Double-Lasso**
 Ulrich D. S. AIOUNOU,  Sullivan Hué,  Sébastien Laurent,  Emmanuel Flachaire.
 *Working paper.*
Abstract. Post-Double-Lasso is becoming the most popular method for estimating linear regression models with many covariates when the purpose is to obtain an accurate estimate of a parameter of interest, such as an average treatment effect. However, this method can suffer from substantial omitted variable bias in finite sample. We propose a new method called Post-Double-Autometrics, which is based on Autometrics, and show that this method outperforms Post-Double-Lasso. Its use in a standard application of economic growth sheds new light on the hypothesis of convergence from poor to rich economies.

Research experience

- May 2022 – Jul 2022  **Research internship, Aix Marseille School of Economics (AMSE)** Marseille, France
 - Python implementation of game-theory simulations.
 - Replication of mathematical proofs.
 - Data visualization.

Teaching experience

- 2026–2027  **Teaching and Research Fellow (ATER 100%)** Aix-en-Provence, France
Aix-Marseille University | **Total done: 170h**
 - *Introduction to programming for data analysis with R*: Master's year 1; tutorial; 12h.
 - *Microeconomics 2*: Undergraduate year 2; tutorial; 30h.
 - *Applied Mathematics*: Master's year 1; tutorial; 44h.
 - *Mathematics 1*: Undergraduate year 1; tutorial; 84h.

Teaching experience (continued)

2025–2026	■ Teaching and Research Fellow (ATER 50%) Aix-Marseille University Total done: 90h • <i>Applied Mathematics</i>: Master's year 1; tutorial; 24h. • <i>Mathematics 1</i>: Undergraduate year 1; tutorial; 48h. • <i>Microeconomics</i>: Undergraduate year 1; lecture; 18h.	Aix-en-Provence, France
2024–2025	■ Graduate Teaching Assistant (GTA) Aix-Marseille University Total done: 60h • <i>Econometrics</i>: Master's year 1; tutorial; 24h. • <i>Mathematics 1</i>: Undergraduate year 1; tutorial; 36h.	Aix-en-Provence, France
2023–2024	■ Graduate Teaching Assistant (GTA) Aix-Marseille University Total done: 74h • <i>Econometrics</i>: Master's year 1; tutorial; 14h. • <i>Mathematics 1</i>: Undergraduate year 1; tutorial; 24h. • <i>Microeconomics</i>: Undergraduate year 1; tutorial; 36h.	Aix-en-Provence, France
2022–2023	■ Graduate Teaching Assistant (GTA) Aix-Marseille University Total done: 48h • <i>Econometrics</i>: Master's year 1; tutorial; 24h. • <i>Mathematics 1</i>: Undergraduate year 1; tutorial; 24h.	Aix-en-Provence, France

Teaching topics

Econometrics	■ Probability, linear regression, hypothesis testing, confidence intervals and assumption violations.
Mathematics	■ Single- and multivariable functions, Taylor expansions and optimization; convex analysis, cones, constraint qualifications, KKT conditions and duality; differential systems, Jordan forms, matrix exponentials, phase portraits, stability and bifurcation.
Microeconomics	■ Consumer theory, preferences, budget constraints and utility maximization; production, costs, profit maximization and market structures.
R programming	■ R fundamentals, introductory econometrics, data manipulation with dplyr and visualization with ggplot2.

Conferences and workshops

13 Mar 2026	■ CRREP Research Day	Quebec City, Canada
14–16 Dec 2024	■ CFE-CMStatistics 2024	London, UK
2024	■ Doctoral Workshop on Applied Econometrics	Konstanz, Germany

Seminars

16 Apr 2026	■ Economics Seminar Concordia University	Montreal, Canada
27 Feb 2025	■ PhD Seminar CREST	Palaiseau, France
2024	■ Franco-Japanese Webinar Aix-Marseille University	Online
2023	■ Franco-Japanese One-Day Seminar on International Economics and Finance Aix-Marseille University	Aix-en-Provence, France
2022–2026	■ PhD Seminar Aix-Marseille University	Marseille, France

Selected computational projects

- Project  **Predicting the popularity of an article**
- Applied machine-learning algorithms to predict article popularity from article characteristics.
- Tools: [Python](#) [R](#)
- Project  **Aorta detection**
- Applied semantic segmentation to recognize the aorta in medical images.
- Tools: [Python](#) [R](#)
- Project  **Aircraft title recognition**
- Used machine-learning algorithms to read identification numbers from aircraft images.
- Tools: [Python](#) [Streamlit](#)
-  [View code](#)

Other projects

- Project  **Pressing API**
- API for managing customers, orders and products for a dry-cleaning company.
- Tools: [fastAPI](#) [Pug template engine](#) [Docker](#) [Github Actions](#)
-  [API demo](#)
- Project  **Couture mobile**
- Android application for stylists and fashion-house managers to manage their activities.
- Tools: [Android SDK](#) [Java](#) [Firebase](#) [Sqlite](#) [Clouds Functions](#)
-  [View app](#)
- Project  **Lebondej**
- Click-and-collect food website.
- Tools: [NuxtJs](#) [FeathersJs](#) [Bootstrap](#) [Stripe](#) [Google Maps API](#) [Docker](#) [Github Actions](#) [AWS S3](#)
-  [View demo](#)  [API demo](#)
- Project  **Afrikpharma**
- Pharmacy sales platform with a product-management dashboard and online ordering.
- Tools: [NuxtJs](#) [FeathersJs](#) [Bootstrap](#) [Stripe](#) [Google Maps API](#) [Docker](#) [Github Actions](#) [AWS S3](#)
-  [View demo](#)  [API demo](#)  [Dashboard](#)
- Project  **Ai4innov**
- Showcase website for an association specializing in artificial intelligence.
- Tools: [HTML & CSS](#) [JavaScript](#)
-  [View demo](#)

Additional professional experience

- Jun 2021 – May 2023  **Full-stack Developer** Marseille, France
- IA4Innov
- Frontend integration.
 - API consumption.
- Dec 2019 – Aug 2020  **Full-stack Developer & Data Scientist** Cotonou, Bénin
- Osspo International/Wanoon
- Project manager, project management by Agile.
 - API implementation.
 - Web scraping & data cleaning.
 - Frontend integration.

Additional professional experience (continued)

Jun 2019 – Nov 2020	 Statistics internship Atlantique Banque • Automated calculation of performance indicators. • Reporting generation automation.	Cotonou, Bénin
Oct 2018 – Nov 2018	 Freelance statistician IB Consulting • Data management and manipulation for the Benin Prison Agency 2019–2023 strategic plan.	Cotonou, Bénin
Aug 2018 – Oct 2018	 Statistician Freelance Consulting • Data management and manipulation for the Ministry of Energy of Benin 2019–2023 strategic plan.	Cotonou, Bénin

Technical skills

Programming	 Python, R, JavaScript and Java.
Data analysis	 Pandas, Apache Spark, Matplotlib and Scrapy; dplyr, ggplot2, Tidyverse and R Markdown; Streamlit.
Software delivery	 FastAPI, Docker, GitHub Actions; API implementation, web scraping and data cleaning.

Languages

French	 Native
English	 Professional

Personal interests

-  Football; Reading scientific literature; Travel.

References

Available on request