# Melvin SDAO

Marseille, France

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## Research Interests

Systemic risk and financial contagion; financial networks and cross-holdings; banking regulation (Basel III / FRTB); microeconomics of banking and financial intermediation; risk measurement.

## Education

**Aix Marseille School of Economics** — **Marseille, France**

*PhD in Finance and Game Theory* — *2026 – Present*

Supervised by Prof. Mohamed Belhaj and Prof. Renaud Bourlès

Dissertation: "Risk-Taking, Contagion, and Regulation in Heterogeneous Financial Networks"

**Aix-Marseille School of Economics** — **Marseille, France**

*Research Master in Economics (Double Degree)* — *2025 – 2026*

- Core training: Advanced Econometrics, Microeconomics, Macroeconomics, research methodology
- Master's thesis in banking microeconomics, financial regulation and systemic risk, supervised by Prof. Renaud Bourlès (detailed under *Research Experience*)

**École Centrale Méditerranée** — **Marseille, France**

*Engineering Degree — Financial Mathematics* — *2023 – 2026*

DDEFI track (Economic and Financial Data and Decisions). Selected coursework:

- Stochastic calculus and time series: martingales, Brownian motion, Itô calculus, ARMA
- Quantitative finance: interest-rate models (Vasicek, CIR, Hull–White, HJM, LMM), volatility models (Black–Scholes, Heston, SABR, Dupire), option pricing and Greeks
- Risk and regulation: VaR, Expected Shortfall, credit risk (Merton, Jarrow–Turnbull), copulas, extreme value theory, Basel II/III
- Portfolio management and asset allocation: Markowitz, Smart Beta, yield curves

## Research Experience

**Aix-Marseille School of Economics (AMSE)** — **Marseille, France**

*Master's Thesis — Risk-Taking and Heterogeneous Network* — *2025 – 2026*

Supervised by Prof. Renaud Bourlès. A theoretical and numerical model of risk-taking in a network of cross-holding banks under a Basel III Expected-Shortfall constraint. With heterogeneous loss profiles (bounded credit risk versus a heavy market tail) and correlated shocks, the regulation-pinned Nash equilibrium is unique under weak interconnection and risk-taking is non-monotone in interconnection: the investment bank's exposure peaks at an interior level of cross-holding, an effect absent from the homogeneous benchmark. Methods: game theory, fixed-point theorems, coherent risk measures, numerical simulation (Python). JEL: G21, G28, D85, G32.

**École Centrale Méditerranée / AMSE** — **Marseille, France**

*Research Apprentice* — *2023 – 2026*

Multi-year mentored research engagement under Prof. Renaud Bourlès on environmental economics, environmental dumping and political economics.

**École Centrale Méditerranée / ESSAI** — **Tunis, Tunisia**

*Research Assistant* — *April 2026 – July 2026*

Under the supervision of Prof. Rim Lahmandi-Ayed.

Worked on "Democracy and competition : Vertical differentiation and labor in a general equilibrium model" and an extension taking into account environmental sensibility.

## Working papers

## Selected Projects

**École Centrale Méditerranée / Amundi** — **Marseille, France**

*LLM-based Financial Decision Agent* — *2025 – 2026*

Applied research project on Large Language Models for financial decision support. Design of an end-to-end agent integrating structured financial data, risk constraints and model-based reasoning, with emphasis on robustness, interpretability and alignment with institutional risk frameworks.

## Professional Experience

**NP Solutions** **Marseille, France**
*Quantitative Developer (Internship)* *Jun – Aug 2025*
Development and optimisation of quantitative trading strategies, implementation in a proprietary trading language, signal calibration and performance evaluation.

## Teaching

**École Centrale Méditerranée** **Marseille, France**
*Teaching Assistant* *2026 – Present*

- Introduction to Economics — 1st-year engineering (3rd year of higher education), 32h
- Banking Economics — 2nd-year engineering (M1 level), 6h

## Technical Skills

**Programming**: Python (numpy, pandas, scipy), Matlab, R (econometrics), SQL, Java, LaTeX

**Quantitative methods**: Game theory, stochastic modelling, econometrics, financial networks, risk measurement, portfolio theory

**Languages**: French (native), English (fluent), Chinese (basic)