CAO Zhongyuan

Ph.D in Applied Mathematics

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Research Interests

Mean field game theory, Stochastic control, Systemic risk, Interacting systems

Appointments

Postdoc of Mathematics at NYU Shanghai, since Oct. 2023.

Education

Université Paris Dauphine — INRIA (Paris center) Paris, Oct. 2020 – Sep.2023

Ph.D in applied mathematics

- **Thesis**: Systemic Risk, Complex Financial Networks and Graphon Mean Field Interacting Systems
- **Supervisors**: Prof. Agnès Sulem and Prof. Hamed Amini

Sorbonne Université (Pierre and Marie Curie campus) Paris, Sep. 2019 – Jun. 2020

M.Sc in Mathematics and Applications specializing in Probability and Random Models

Jilin University Changchun, Sep. 2013 – Jun. 2017

B.Sc in Statistics (including financial Mathematics)

Experience

Research Visit Jun. 2023

- University of Florida

Research internship in team Mathrisk at Inria-Paris Apr. 2020-Jul. 2020

- **Subject**: Dynamic modelling and Control of systemic risk
- **Supervised** by Prof. Agnès Sulem and Prof. Hamed Amini.
- **Research**: Mean field games and systemic risk, networked ruin theory, contagion models in financial networks.

National Competition of mathematical modelling of China Dec. 2015

- 2nd prize

Competition of mathematical modelling of Jilin Province May. 2015

- 1st prize

Teachings

Teaching Assistant, *Probability & Statistics*, 2023 Fall, NYU Shanghai.

Honors and Awards

PhD fellowship of DIM Math Innov, Paris Foundation of Mathematical Sciences (FSMP).

Talks

1.Limit Theorems for Default Contagion and Systemic Risk, *INRIA Junior Seminar*, Paris, Sep 2021.

2.Limit Theorems for Default Contagion and Systemic Risk, *INFORMS Annual Conference*, Oct 2021.

3.Fire sales, default cascades and complex financial networks, *11th World Congress of the Bachelier Finance Society*, Jun 2022.

4.Graphon mean-field BSDEs with jumps and associated dynamic risk measures, *Groupe de Travail Méthodes Stochastiques et Finance*, ENPC, Paris, Jan 2023.

5.Graphon mean-field BSDEs with jumps and associated dynamic risk measures, *Financial Mathematics Seminar*, University of Michigan, Feb 2023.

6.Graphon mean-field BSDEs with jumps and associated dynamic risk measures, *SIAM Conference on Financial Mathematics and Engineering*, Philadelphia , Jun 2023.

7.Stochastic graphon mean field games with jumps and approximate Nash equilibria, Poster presentation, *43rd Conference on Stochastic Processes and their Applications*, Lisbon , Jul 2023.

8.Systemic Risk and Complex Financial Networks, *Postdoc Seminar*, NYU Shanghai , Nov 2023.

Publications and Preprints

1. Hamed Amini, **Zhongyuan Cao**, and Agnès Sulem. Limit theorems for default contagion and systemic risk. *Available at SSRN 3811107, To appear in Mathematics of Operations Research*, 2021

2. Hamed Amini, **Zhongyuan Cao**, and Agnès Sulem. Fire sales, default cascades and complex financial networks. *Available at SSRN 3935450, Submitted*, 2021

3. Hamed Amini, **Zhongyuan Cao**, and Agnès Sulem. Graphon mean-field backward stochastic differential equations with jumps and associated dynamic risk measures. *Available at SSRN 4162616, Submitted*, 2022

4. Hamed Amini, **Zhongyuan Cao**, and Agnès Sulem. Ruin probabilities for risk processes in stochastic networks. *Available at SSRN 4355988, Submitted*, 2022

5. Hamed Amini, **Zhongyuan Cao**, and Agnès Sulem. Default cascade processes in stochastic financial networks. *International Conference on Artificial Intelligence in Finance (ICAIF)*, 2023

6. Hamed Amini, **Zhongyuan Cao**, and Agnès Sulem. Stochastic graphon mean field games with jumps and approximate nash equilibria. *Available at SSRN 4412999, Submitted*, 2023

7. Hamed Amini, **Zhongyuan Cao**, Gökçe Dayanikli, Mathieu Laurière, Agnès Sulem, and Kexin Shao. Learning extended graphon mean field games. *In progress*, 2023

8. **Zhongyuan Cao** and Mathieu Laurière. Forward-backward stochastic differential equations and controlled graphon mean field dynamics. *In progress*, 2023

9. **Zhongyuan Cao** and Mathieu Laurière. Graphon mean field systems with delayed interactions. *In progress*, 2023