This Postdoctoral Research Fellowship position is proposed by the Mathrisk Research team, https://team.inria.fr/mathrisk/en/, which is common with INRIA, the Ecole Nationale des Ponts et Chaussées and the University of Marne-la-Vallée.

The Mathrisk team addresses broad research topics in the area of mathematical handling of risk, embracing risk measurement and risk management, modeling and optimization in quantitative finance and other related domains where risk control is paramount. It also develops a numerical platform for quantitative finance(http://www.premia.fr), supported by a consortium of financial institutions. Mathematical expertise of the team include stochastic modeling, stochastic analysis, in particular stochastic (partial) differential equations and various aspects of stochastic control and optimal stopping of these equations, stochastic optimization, dynamic game theory, random graphs, martingale optimal transport and numerical probability.

In the last years, systemic risk has emerged as one of the major research topics. By contrast with the traditional approach in risk management, the focus is no longer on modeling the risks faced by a single institution, but on modeling the complex interrelations between institutions and the mechanisms of distress propagation among these.

As demonstrated by the last crisis, adequate tools for monitoring stability in large and complex financial systems should accurately capture the risks due to a variety of interconnections in these systems.

In this context, the research proposal addresses the issues of Dynamics and Stability of Complex Financial networks.

**Contexte et atouts du poste**

This Postdoctoral Research Visit F/M Systemic risk in financial systems: Dynamics and Stability of Complex Financial networks (Campagne post-doctorants) is part of a broader mission: to study the interbank contagion in financial systems and to derive forward looking systemic risk measurement tools.

**Mission confiée**

**Assignments**

The objective is to develop data-driven stochastic network models for quantifying systemic and liquidity risk in financial systems, and to derive forward looking systemic risk measurement tools.

The literature on network models for systemic risk has seen a sharp increase after the crisis, trying to provide tools to understand the relation between network structure and systemic risk. Most resulting insights are qualitative in nature and do not take into account the heterogeneity, variety of contagion channels and dynamics of the financial system.

Data on interbank linkages reveal a complex and heterogeneous structure which is poorly represented by simple network models used in the theoretical literature. Another critical point to consider in a network model of financial contagious is missing data. It is only in some few cases that we have complete information on interbank linkages. In general only partial information on the interbank network and only aggregate data is available.

The aim of this project is to provide a tractable stochastic dynamic financial network model, which allows to study some important aspects of financial networks and systemic risk. In particular we shall try to capture the partial information setting by introducing a heterogeneous random network model consistent with the observable data.

**References**


**Informations générales**

- **Thème/Domaine** : Approches stochastiques
- **Ville** : Paris
- **Centre Inria** : CRI de Paris
- **Date de prise de fonction souhaitée** : 2020-11-01
- **Duree de contrat** : 18 mois
- **Date limite pour postuler** : 2020-05-25

**Contacts**

- **Equipe Inria** : MATHRISK
- **Recruteur** : Sulem Agnès / Agnes.Bairoboda_Sulem@inria.fr

**A propos d'Inria**

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie plus de 2600 personnes. Ses 200 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3500 scientifiques pour relever les défis du numérique, souvent à l’interface d’autres disciplines. L’institut fait appel à de nombreux talents dans plus d’une quarantaine de métiers différents. 900 personnels d’appui à la recherche et à l’innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 180 start-up. L’institut s’efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l’économie.

**L’essentiel pour réussir**

**Skills required:**

Specialists in stochastic analysis, random graph theory, numerical probability, financial mathematics, operations research, network analysis, game theory are welcome.

**Experience in financial modelling and machine learning for complex financial data is highly appreciated.**

**Application**

The candidates must send a letter of motivation explaining how their scientific skills and profile match the research proposal. Their application should also include:

* a CV
* the list of publications
* the thesis reports (if the thesis has been already defended)
* Candidates who have not yet defended their thesis must provide a letter from their PhD adviser certifying that the thesis is ready to be defended, giving a date of defense and the composition of the defense committee.
* Recommendation letters (at least a letter from the PhD adviser)

The expected starting date can be as soon as possible but given the current context, we will not be able to give a precise date for taking up the job.

**Consignes pour postuler**

**Sécurité défense**

Ce poste est susceptible d’être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L’autorisation d’accès à une zone est délivrée par le chef


Collaboration:
The recruited person will work in collaboration with Agnès Sulem, INRIA Paris, agnes.sulem@inria.fr and Hamed Amini, Associate Professor in Department of Risk Management and Insurance, J. Mack Robinson College of Business @ Georgia State University, hamini@gsu.edu.

Principales activités

Main activities:
It is expected that the successful candidate will conduct novel research in the proposed topic and will be able to valorize it by writing articles and presenting the results in workshops and conferences. The postdoctoral fellow will also participate to the scientific life of the team, in particular by attendance to the seminars. He/she might visit Prof Hamed Amini in Georgia State University for collaboration.

Compétences

PhD in applied mathematics or Computer sciences.

Avantages

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage