Best Young Researcher in Finance and Insurance, Olivier Guéant: "Liquidity provision remains a central research topic in the short and medium term."

The 2023 Prize for the Best Young Researcher in Finance and Insurance IEF/Scor Foundation for Science was awarded on 21st of March during the second day of the Risks Forum, organised by the Institut Louis Bachelier, which took place at the Paris Chamber of Commerce and Industry. The prize, sponsored by the Scor Foundation for Science, was awarded this year to Olivier Guéant, Professor of Applied Mathematics at the University of Paris 1 Panthéon-Sorbonne. On the side-lines of the award ceremony, he answered our questions.

How do you feel about receiving the IEF/Scor Foundation for Science Best Young Researcher Award in Finance and Insurance?

It is, of course, a great honour! When I look at the list of researchers who have received this prize since its creation, I'm delighted at being its most recent recipient. In addition to the prize itself, I see it as an encouragement to pursue academic research that is both theoretical and inspired by the constantly evolving problems faced by practitioners. Along with the pleasure it gives me today, I hope that this prize will bring long-term visibility to some of the subjects on which I have worked, in particular market-making and complex share buyback programmes. The latter has become important in the US in recent years and is starting to gain prominence in Europe.

Can you tell us about your main areas of research on market-making and optimal execution?

In fact, I have worked on a fairly broad spectrum of topics, all of which address the issue of liquidity in the markets, whether it be the consumption of liquidity or its provision. The initial problem in optimal execution is that of buying or selling a large number of securities over a given period. If you consume liquidity at too high a rate, you worsen the prices you get, but going slowly is a problem because prices move over time. The basic model for dealing with this was developed by Almgren and Chriss just over 20 years ago. A lot of my work has involved using a modelling framework similar to Almgren and Chriss for introducing liquidity issues in particular areas. For example, one can study what happens to option hedging when the underlying asset is not perfectly liquid and what happens to portfolio construction when one takes into account not only the risk profile of the assets but also their liquidity. A portfolio can also be priced by taking into account liquidity premiums. Optimal execution is in fact ubiquitous.

In terms of liquidity provision, the market maker's problem is to continuously offer a bid and an ask price on a set of assets, while optimally managing its inventory risk. A little more than ten years ago, in the paper *Dealing with the inventory risk: a solution to the market making problem*, co-authored with Charles-Albert Lehalle and Joaquin Fernandez-Tapia, we solved the equations of the main existing model, which had been developed by Avellaneda and Stoikov. Since then, with my PhD students and other co-authors around the world, we have developed general mathematical models for building very realistic market-making algorithms in various markets, such as corporate bonds, currencies and cryptocurrencies.

How can your work be applied to the financial sector?

The most obvious examples are my articles on market-making, such as *Optimal market making*, *Closed-form Approximations in Multi-asset Market Making* (co-authored with Philippe Bergault, David

Evangelista and Douglas Vieira) or Market-making by a foreign exchange dealer (co-authored with Alexander Barzykin and Philippe Bergault). The proposed modelling framework is already being used in practice to build simulators and develop strategies. This is especially the case for OTC markets. I frequently talk with people in the industry and I am proud to have found concrete solutions to some rather long-standing problems. Of course, one should not imagine that reading a few papers is sufficient to come up with an excellent market-making algorithm. There are subtleties related to each market, there are estimation and filtering issues that are sometimes very complex, there are implementation issues, and so on.

Finally, what will be your next research topics?

The provision of liquidity remains a central research topic in the short and medium term – all the more so as the emergence of decentralised finance has raised new issues in this area. Regarding optimal execution, I'd worked on share buyback contracts in the past, notably using artificial intelligence tools. The recent growth in Europe of buy-back contracts with complex clauses makes me want to work on this subject again. I also have quite a few transversal projects on statistical issues. What I have learned as a researcher is that you always have to listen to others and their problems, both practical and theoretical, and that interesting topics are always emerging. Five years from now, I may have been working on very different topics, for example in green finance.

<u>**Biography**</u>:

Olivier Guéant is a Professor of Applied Mathematics at Université Paris 1 Panthéon-Sorbonne and Adjunct Professor of Quantitative Finance at ENSAE. He leads the team "Modélisation Financière" at the Centre d'Economie de la Sorbonne (a group of 8 researchers and around 10 PhD students). His research interests are mainly related to optimal execution and market making. In particular he developed cutting-edge models that are used by dealers on OTC markets (notably in FX and corporate bonds markets). He was awarded the Rosemont-Demassieux Prize for his PhD on mean field games in 2010.