Interview: Marlon Azinovic

From PhD Studies at the Department of Finance at University of Zurich to a Tenure Track Career in the USA

Dr. Marlon Azinovic

- UZH, Department of Finance: PhD in Banking and Finance (2016 to 2021)
- UZH, Department of Economics: Postdoctoral Researcher (2021 to 2022)
- Visiting Postdoc at the University of Pennsylvania, Department of Economics (2022 to 2024)
- Starting in 2024: Assistant Professor (Tenure-Track), University of North Carolina at Chapel Hill, USA

Interview:

Dr. Azinovic, what motivated you to pursue a PhD in Banking and Finance at the University of Zurich?

Since I was coming from Physics, I thought it was amazing that I could first take classes before delving into research in a new field. This is not the case for a PhD in most other subjects. Then, when I saw the research done at UZH, by Felix Kuebler and his PhD students and Postdocs at that time, I knew that it would be very exciting for me to work on computational economics and that UZH is the very, very best place to do so.

What made you switch from Physics at ETH to the world of finance?

At that time my girlfriend (we will get married this month) studied the Banking and Finance Master at UZH, and what she did always looked interesting to me.

Additionally, I always thought that economics and finance are extremely important fields for society. If we look around the world there are so many things, we clearly don't understand yet. There is so much inequality, between and within countries and across so many dimensions of life. When economic downturns happen, different people are exposed and react differentially. How should we deal with climate change?

Any progress we can make in understanding those issues can be extremely beneficial for society. Economics and finance give us the right tools to think about these crucially important questions rigorously.

Lastly, I think that it's very fruitful if people from different backgrounds come together and work on something new. There is so much to learn from people who don't come from the same background, and I believe innovation often happens at interfaces.

Would you like to share some highlights or memorable experiences from your time as a PhD student at the University of Zurich/Department of Finance?

The first year great. My cohort was full of kind and brilliant people we quickly became very, very good friends and befriended the economics cohort who took Micro and Econometrics with us.

Another highlight was when Felix Kuebler agreed to be my advisor, I was very happy because I knew his group would be an excellent fit for me.

One of the best moments was when Luca, Simon, and I first started working on deep learning-based solution methods to compute equilibria in economic models and quickly we managed so solve models, which were beyond what people could solve at that time. I completely had no

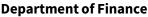idea whether it would work and then it just did, I was so excited.

Tell us about your doctoral research, highlights, and contributions you made to your field during your PhD program?

My thesis was called **Essays in Computational Macro Finance** and it is comprised of three chapters.

In the **first chapter**, Luca Gaegauf (UZH), Simon Scheidegger (Uni Lausanne) and me showed how we can compute equilibria using deep learning.

Computing an equilibrium in our setting means finding functions such that they fulfill a set of functional equations. We had the idea to use a neural network to approximate these functions we want to find and to train the neural network directly to fulfill those functional equations.

The key is that we don't need what is called labeled data (i.e. the true output of the functions for a given input) to train the neural network. Instead, we just need to plug our neural network into both sides of the functional equations and then see whether the left hand side is equal to the right hand side. If not, we adjust the parameters of the neural network to make both sides more equal to each other and then we repeat the process. This makes the evaluation of the loss function computationally cheap and allows us to train the neural network on billions of simulated data points.

> "The first year as a PhD student was so much fun. My cohort was full of kind and brilliant people."

For the **second chapter**, I was very lucky to work with Felix Kuebler (UZH) and Harold Cole (UPenn) on a model with aggregate risk, idiosyncratic risk and heterogeneous trading technologies across households. I was fortunate to learn a lot from my coauthors and really enjoy working with them. They patiently taught me and our Skype calls always brought joy to my life, especially during the otherwise pretty dark Covid period. We kept working on the project and use our calibrated model to investigate if infinite rollover of government debt is possible in settings with very low interest rates and aggregate risk (the answer so far is no).

For the **third chapter**, which is still ongoing work, I was studying the effect of uncertainty shocks on different age groups.

Let's talk about your Postdoc times: How did your PhD experience at the University of Zurich's Department of Finance prepare you for your current job placement?

My PhD experience was crucial. I got introduced to finance and economics, I learned what an economic model even is and how research can look like. I was very lucky to be in an amazing group and always surrounded by not only brilliant but also kind, generous and encouraging people. I also met Nir Jaimovich during my PhD at UZH, who was the first to teach me macroeconomics and became not only a member of my PhD committee, but also my postdoc advisor at UZH. I always think "what would Nir say?" when trying to sharpen my research questions.

His help, together with the help of my other advisors, and support was crucial for me during the job market, and we are still working on exciting projects together. Alessandro Ferrari from the economics department, Yucheng Yang from the finance department, as well as my cohort mates, despite not formally being my advisors, spent countless hours with me, tirelessly helping me to improve my research, my job market "Spiel", and always providing me with support and encouragement. I am also extremely grateful to Jan Zemlicka, who is my coauthor on my job market paper. He was the perfect coauthor throughout the difficult job market process and still is.

How would you describe your research evolution, looking back to when you started your research with the summer research project (SRP) to you job market paper?

In my summer research paper, I used policy time iteration for the first time in my life, this solution method is closely related to the deep learning-based method which later became my first publication in economics. My SRP also had a portfolio choice problem that deep learning-based solution methods are struggling with, an issue that Jan and I try to make progress on in my job market paper. Felix Kuebler recommended me the SRP project and I think it was really the perfect starting point for me to delve into many aspects of numerical methods for financial economics and heterogeneous agent macro, which I am still working on.

I also still remember the rookie mistake I did in my SRP with led to me not being able to solve the model for several weeks. It's a bit sad, but I still spend a lot (maybe most) of my time trying to figure out where I screwed up.

What motivated you to pursue an academic career?

When I started my PhD I was not even aware that aiming for an academic career was something one was even allowed to do (Gazi told me). I think economics is an amazing subject. We use tools from computer science, statistics, linear algebra and many more fields to find substantiated scientific answers to the most pressing questions of our time. Being able to do this as a job is an absolute privilege, I could not envision a better job.

How did the puzzle pieces, from UZH DF to Econ to Penn to UNC fit together?

I feel like every step was necessary and no step was sufficient. At every department I worked at I was extremely lucky to be surrounded by amazing economists who were supportive and willing to invest their time to teach me. discuss with me, improve my research and ultimately make me a better economist. UPenn for example has an amazing and big macro department, with two macro seminars every week and two more at Wharton.

I came in as a visitor and was quite shy in the beginning. But Harold, Dirk, Victor, Guillermo, Joachim, Jesus, and the group of students interested in macro, and many more really welcomed and included me and invested their time to teach me, and to give me extremely helpful feedback and advice. I am very grateful to my advisors, my teachers, my colleagues and for all the support I received wherever I went.

UNC has an amazing macro group, and I am already very excited to join them and to contribute to the vibrant research environment at Chapel Hill.

Let's talk about your future plans! What are your current research interests and how do they align with the ongoing research projects or focus areas within the Macro group at UNC Chapel Hill? Are there any specific research collaborations or initiatives you're looking forward to pursuing in the future?

My research interests are focused on household heterogeneity and aggregate fluctuations. UNC Chapel Hill has amazing researchers, such as Stan, Lutz, and Can, who are working on related topics and I am also very excited because I also share interests with PhD students at UNC and other junior faculty members, who will join the department together with me.

UNC also has a strong econometrics and IO groups, working on deep learning and even quantum computing, topics I find very intriguing as well. It will be very exciting and I can't wait for the new chapter of my life to start.

Of course I hope that I will keep working with my amazing coauthors, who I had and have the honor and pleasure to work with.

"UNC has an amazing macro group, and I am looking forward to contribute to the vibrant research environment at Chapel Hill."

They are really the best coauthors I could possibly imagine. I am also very much looking forward to start research projects with my new colleagues at UNC, to learn more, and to figuring things out together.

What advice would you give to current PhD students in Finance who are aiming for positions in academia after completing their studies? Are there any specific strategies or preparations they should consider?

I think I was mainly lucky to find supportive people and an academic position, as there is a lot of uncertainty and many things are out of our hands. So if I were to make claims about what I think helped me, those claims would certainly not pass the identification police.

However, that being said and assuming free disposal, I will say this:

Don't be scared.

1. Don't be scared that you can't solve your model. Simplify if you can but don't be shy to try something ambitious, there might be a way. [Advice credit to Victor]

2. Don't be scared to talk to (even very senior) people. They give amazing advice and will be really, really helpful to sharpen your thinking. I got so, so, so much great advice from so many different people and literally everyone helped me understand my own model better. [Advice credit to Xiao]

3. Don't be scared to be open about where your paper is lacking. Every paper has weaknesses and you are a better economist for knowing the weaknesses of yours. If you know how to address them in the future, even better. [Advice credit to Nir]

When the job market is close and you need to prepare specifically for interviews, talk to people who where on the market recently. Alessandro Ferrari, Yucheng Yang, and Gazi Kabas massively helped me to prepare for interview questions.

Finale advice: Smile and look into the camera. Maybe put a sticker next to the camera to remind yourself. [Advice credit to Li]

Thank you very much for this interesting interview and for the insights you have shared with us.

Best of luck with your future endeavors!

Cornelia Kegele, Head of Communications and Nadia Dang, Student Assistant from University of Zurich, Department of Finance