

The Field of Financial Mathematics

John Dodson

September 1, 2015

This is a transcript of a brief talk to the theme, “the field of financial mathematics” prepared for the orientation of the 2015-16 matriculating class of the Minnesota masters in financial mathematics program.

Personal introduction

I am a member of the advisory board of the Minnesota Center for Financial and Actuarial Mathematics and have taught for the Masters in Financial Mathematics program since 2007. I currently teach a twelve-week module for the practitioner sequence about the theory and practice of quantitative risk management. I have degrees in mathematics and physics from Stanford and am a '96 graduate of the Carnegie Mellon computational finance program. I have worked in banking, insurance, investments, and securities for more than twenty years. I am currently the head quant for the Options Clearing Corporation in Chicago, which is the central counterparty for all stock options listed on American exchanges. I live and work in Chicago, but I am proud to be affiliated exclusively with the Minnesota financial mathematics program and I visit campus as often as I can for on-site lectures and office hours.

For me, the capital markets were a love at first sight—specifically that of the Swiss Franc / U. S. Dollar exchange rate I used to value my pay as an intern at CERN near Geneva during the summer when Saddam Hussein and George Bush faced-off for control of the Kuwaiti and Saudi oil fields almost exactly 25 years ago. The Swiss news portrayed these events as a clash of vain imperialists; but from my perspective it seemed that the commodity, bond, and currency markets were the real geo-political forces—and these were forces I just had to study and try to understand!

What are the traits of a promising entry-level quant?

You do not necessarily need a doctorate degree to operate at the highest levels as a quant, but you need to be able to write either very good code or very good papers (or both). You also need to live in a financial center (London, New York, Hong Kong). Outside of the financial centers, there are many opportunities for quants in various specializations, including regional banking, treasury management, commodity trading, investment management, insurance, financial utilities, central banking, and industry regulation.

Capital markets employers in the financial centers usually recruit students at the entry-level and provide training. An excellent academic profile and a good internship are key to getting accepted into such a training program. To be successful at the entry-level in a more specialized institution, it helps to know something about the particular domain and possibly acquire some specialized credentials, such as a start on the financial analyst charter for investment management or an actuarial charter for insurance.

I recommend you choose a specialization and start looking for an internship soon if you are going to be job-hunting after graduation. Outside of the elite ranks, the industry is very tribal; and evidence of loyalty to a specialization in an entry-level job application will impress. Unless you are obviously brilliant and headed for Wall Street, focus on depth not breadth.

If you are a foreign national and you are not planning to start your career back in your home country, keep in mind that in the U. S. your employer must sponsor your work authorization beyond an introductory period. That is a big hurdle at the entry-level for middle-tier firms. Smaller or more isolated firms with limited access to qualified candidates may be more willing to make this investment. The MCFAM alumni network should be helpful in this regard.

What is the industry hiring quants to do?

The main entry-level opportunities for quants are in software maintenance and data management. To be especially attractive, it is worth picking-up some of the basic principles in software engineering and database design. I suggest you build a personal website and join an open-source project to demonstrate this concretely.

My employer has quants working in four areas: model development, model validation, system development, and system testing.

Throughout the industry, there has been an increasing emphasis on risk management and model validation. Model validation in particular has seen an explosion in hiring in the aftermath of the 2007-8 financial crisis. Other opportunities arising since the financial crisis are in regulatory risk surveillance including stress testing.

One (probably unintended) consequence of the regulatory response to the financial crisis has been increased opportunities for technology-enabled non-traditional providers to disrupt traditional retail financial services like lending and advice using fin-tech, block-chain, and peer-to-peer networks. I suspect that the successful disruptors are likely to be eventually subsumed into incumbents; but in any case this evolution is producing new opportunities for quants with strong software development skills.

Typical quant risk management domains include consumer credit for banking institutions, investment performance measurement for investment managers, derivative valuation and counterparty exposure measurement for treasuries.

Conclusion

In conclusion, welcome to the program! I look forward to meeting you in FM5031/2. If you find yourself in Chicago, let's try to connect in person.