

A View on the Transition from Academia to Finance

Catherine O'Neil

I have been asked to write an article describing the transition from academia to finance, an advice and mentoring essay for the sake of mathematicians who may be thinking of making this switch and graduate students who may be considering finance as their career path. I feel the best way to convey this information is in a question and answer format. Below I have responded to questions I frequently get regarding my new job at the D. E. Shaw group. Before I get to those questions and answers, I would like to briefly say something about my background and myself. After earning a degree in math from UC Berkeley in 1994, I went to Harvard as a graduate student where I studied number theory under Barry Mazur and graduated with a Ph.D. in 1999. I then went to the Massachusetts Institute of Technology as a Moore instructor and then a second postdoc; during my time at MIT I had two children. I solved my “two-body problem” in 2005 by getting a tenure-track job at Barnard College. I started working at the D. E. Shaw group in June of 2007. Now on to the questions:

1) Why leave academia? Why finance? Why the D. E. Shaw group?

I found the time scale of academic life frustrating. What started as a moment of insight would take years to get published and disseminated, and that's if you're lucky. On the other hand, I had focused since I was nineteen on becoming a mathematician, and it seemed silly to give up on my field of expertise and talent altogether, not to mention that I love mathematics. I wanted to use my talents to do something immediate, rewarding, and business-oriented, while staying highly mathematical.

Catherine O'Neil is a quantitative analyst for the D. E. Shaw group. Her email address is oneilc@deshaw.com.

Finance is a huge and rapidly growing, sexy new field which combines the newest technology with the invention of mathematics to deal with ever more abundant data. It is the essence of modernity, and paired with New York City's infinite energy, I found it extremely attractive. It was really as simple as that—I didn't actually know any finance when I decided to apply.

I first heard of the D. E. Shaw group when Eric Wepsic, my high school math friend, chose to leave Harvard math graduate school to work at this company way back in 1994. Eric would send me emails every year or so, asking if I knew anyone interested in working there, and one day I wrote back and said, “How about me?” The D. E. Shaw group was particularly appealing because it is known for being a well-run company, and since I had decided to try my hand at business, I wanted to start at a good one. Although some people apply to the D. E. Shaw group because it's known as being pretty academic, I think this is not an appropriate line of reasoning: get a job here if you want to be in business and *not* academics.

Having said that, I want to point out that it is not essential to have a connection to get a job here. We put an enormous emphasis on hiring the very best people, and we interview a huge number of people. Once we receive an application it is screened for fit. If it passes this initial screening we grant the candidate a phone interview. If the phone interview goes well, we then give an in-house interview. We do not ask for letters of reference but do contact references directly if the interview process progresses.

2) What is the D. E. Shaw group like? What do they do there?

There are a number of groups here and some of them, including my group, focus on the systematic quantitative investment strategies that made the



Catherine O'Neil

D. E. Shaw group famous, while others work on more fundamental strategies. I work as a “quant” or quantitative analyst in a group consisting of about twenty traders, quants, and programmers. A group can be thought of as being similar to an academic department at a university. Groups differ by the type of financial instrument they trade or the means used to approach the trading of

a common instrument. Frequently, groups overlap in the type of instrument traded but each group has its own way of looking at the market.

As a quant, I am given a series of projects by my manager, which each take between three and eight weeks, including the testing and the write-up. So far, for me, each project has introduced me to a different subuniverse of traded instruments and intellectual tools. I have greatly enjoyed this episodic and intense education in economics and finance.

In the world of finance, the D. E. Shaw group is special. For example, we have no dress code. Personally I don't really care about that, but this flexibility has allowed us to attract a number of really exceptional people for whom this is important. More importantly, we are not expected to work insane hours, which is great for me and my young family. When I say not insane, I should mention I work about 9.5 hours a day, five days a week, which is definitely more time than I spent in my office as an academic.

3) What do you do there?

On a daily scale, my time in largest to smallest allotments is spent writing code to test models, writing up projects, talking to my manager, talking to other quants in my group, attending or giving a weekly seminar, learning techniques and thinking of new models, and reading business news. As a quant my job is to understand how financial markets work, which is neither purely mathematical nor purely social but which has elements of both. I might come up with an idea using broad economic themes but it is not a model until it is in a testable form involving concrete data. Also, in my group we rotate the responsibility of maintaining the automatic computer trading system. This is really just a huge program that decides what and when to trade, and it needs constant attention. So for one week in about thirteen, I am on-call basically all the time. As a recent academic, I find this to be the part of my job that is probably the most

alien and intimidating, but it is also extremely satisfying to be involved with the nuts and bolts of the operation.

On a larger scale, the move from academia to finance has meant a shift in my priorities. Unlike when I was an academic, I no longer have to worry about applying for and getting grants, getting published, and waiting a long time from beginning to end on my projects. Now working in finance I *do* worry about the relevance and testability of my ideas, the minute correctness of my code, and of course profit. Leaving an academic career has meant giving up teaching, the students, and the absolute freedom to work on any project I want. On the other hand, finance has provided me with the opportunity to come up with good, new ideas that will be put into effect, be profitable, and for which I will be directly rewarded.

4) Would I like your job?

To that question, I would counter with these: Are you efficient-minded? Can you sustain focus? Are you flexible about the field to which you apply your quantitative talents? Do you like to understand how systems work as well as the theory behind them? Are you willing to be managed (by a good manager)? Do you enjoy mastering new skills? Do you appreciate the existence of a “bottom line”, a way to quantitatively measure the success of your projects and your ideas? Are you articulate? Are you good at following through and finishing projects?

Notice I didn't ask if you are particularly informed about finance or money per se, because honestly I wasn't when I decided to enter finance. I don't think it was a disadvantage, and now I really enjoy finance and find myself reading finance books instead of fiction. I had also never coded, but now I really enjoy coding. Both of those are skills that anyone with focus, intelligence, and flexibility can master and enjoy. For me and for many of my colleagues it is intrinsically satisfying to be in a collaborative atmosphere as part of a functional, productive, and hard-working team with clear goals.

5) Would you hire me? What does the D. E. Shaw group look for?

The D. E. Shaw group hires people of extraordinary ability. Quant candidates typically come from math, physics, or computer science backgrounds and often have Ph.D.s. This is not to say having a Ph. D. is a requirement, but certainly being capable and smart enough to have a Ph.D. is. What we are really looking for is new ideas, and so our target is the creative, careful thinker. We look for evidence of such talents in the forms of published original papers as well as original personal projects or specialized hobbies. We typically do give brainteasers in interviews, but it is not true that only people who

Photo courtesy of Catherine O'Neil.

are insanely quick at brainteasers are seriously considered. I do not consider myself all that quick, for example, but I am methodical, articulate, and I don't make huge mistakes.

As for wanting to be prepared, I would recommend computer proficiency as a goal. If you are someone who reconfigures your linux kernel nightly you probably have nothing to worry about, but if you've never heard the word "grep" then learning it is a good first step. Knowing your way around computers is probably the most useful and transferable skill you can bring to a place like the D. E. Shaw group, even more so than any specific mathematics or financial subject: strong computer skills are considered a very positive sign on a resume. Having said that, it is not strictly necessary to be a computer savvy person, and people such as myself do get hired not knowing more than a typical mathematician. It is also worth your time to read a book about finance, not so much to gain expertise as to get a general sense of whether you would enjoy it.

6) Is finance a good place for women?

Even though women are extremely underrepresented in finance, and especially as quants, I would maintain that finance is probably a better place for mathematical women than academics. The overall quantitative structure of finance means that your work is constantly being evaluated, and that you are constantly receiving feedback. From my experience, this is far from being true in the sphere of academics, which is much more reputation-based and vague, and where often people who have never read your papers are put in the position of evaluating you. I think women are particularly hurt by such a system, because in my estimation women are more likely to flourish with feedback and documentation of quantifiable success. I encourage women, and for that matter men, to consider these issues when they decide what kind of career to pursue.

7) What about job security?

Working in finance is different from working in academics in that there is no tenure. However, I would recommend thinking about the concept of employability over job security. Although a given company may not last forever, the finance industry is here to stay, and there is always a need for quantitatively strong people. If you find yourself out of a job, but you have real skills and knowledge, chances are you will find another job quickly.

Partly because of this consideration, the D. E. Shaw group tries very hard to get great people and keep them. The turnover is low, partly due to our selectiveness in hiring only the very best people, and partly because people feel valued and don't want to leave. In fact some people have been known to retire early, but soon change their minds and

return. There is little burn-out because the hours and conditions are reasonable.

8) What is corporate culture like?

It is really different. People are both more competitive and more collaborative. They are more competitive in the sense that there's lots of money involved, and therefore getting credit for an idea that makes money is a direct channel to getting paid better. At the same time, everyone relies on their colleagues to keep the whole thing running and so it is imperative that we work as a team. It's an intense, challenging, and exciting environment to work in.

About the money: many mathematicians who talk to me about moving to finance are genuinely worried about the potentially corruptive power of money. I take that fear very seriously, and I think I probably would have applied to the D. E. Shaw group earlier if I hadn't experienced it myself.

Several factors have helped me come to terms with this concern. First, it is really expensive to live in New York, especially with kids. So actually as a new quant, you are not all that rich, even though you are making more than almost all academics. However, it is clear that if you stay in finance for long enough, and are successful, you do become rich. Even so, I do not find my colleagues to be particularly acquisitive, and indeed some of them are known to support progressive causes and charities such as the Robin Hood Foundation, and I'm sure many of them quietly do so as well. In fact it is a stated goal of the D. E. Shaw group to foster an ethical work environment and to do what's right.

I think one can resist being corrupted by money by keeping a perspective and maintaining personal boundaries. I personally give a certain amount of my paycheck to my favorite grass-roots charity. I thereby see working here as a fantastic and rare opportunity to have a great job and to improve the world in some small way simultaneously.