Buy-Side Quant Job Advice

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2/21/2024

N.B.: If you are reading this, it is because I am talking to you for a university presentation, or you have contacted me on LinkedIn (most likely), or Twitter (less likely) or email (even less likely) or SMS (next question: how did you get my phone number? Extra points.) for career advice. This is the best, more comprehensive answer I could come up with.

Let's start with some cautionary remarks. You are probably asking the wrong person, because a) I wanted to do Physics or write books at your age, not finance, and moved into this industry exceptionally late in my career; b) all my decisions in life, including work-related ones, have been strictly non-revenue maximizing. So you can stop reading now, or endure nine pages of advice. Now, let's *really* start. If you are of legal age and are into it, now is an excellent time to grab a stiff drink.

The Outside View

The first question I would like to address is "what are my chances of getting a job as a quant researcher". The "buy-side" is the segment of the financial industry comprising firms who buy securities on their accounts or agents for third parties. They include private equity firms (e.g., Blackstone), venture capital (e.g., Sequoia), asset management firms (e.g., Blackrock), pension funds (e.g., CalPERS), family offices (e.g., Soros), hedge funds (e.g., Citadel), prop trading firms (e.g. Citadel Securities). All of these have some quants on staff, but there are some differences. Every firm is a bit like Orwell's "Animal Farm": all employees are created equal, but some employees are more equal than others. In PEs and VCs quants are not at the core of the business, and in a good portion of asset managers, pension funds and family offices, quants are not working on the most exciting problems. You probably want to begin your career in a place where quants are first-class citizens, and are using their brains. I will focus only on hedge funds and prop trading firms. They also are the only firms I know from direct experience. The first thing to realize is how tiny this segment is[1]. The Assets Under Management of the hedge fund industry are, give or take, $4T, out of about $100T. Prop traders are a rounding error of that $5T. The order of magnitude of hedge funds in operation globally is 10,000, but the distribution is heavy-tailed. Since inception and as of 2023, the top 20 hedge funds have generated 19% of the *total* profits (out of maybe 50,000 HFs). In the past three years, the top three hedge funds (Citadel, Millennium, DE Shaw) have generated 38% of the total PnL.

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[1] All the data I am quoting are from Bloomberg articles, which usually sources from LCH, HFRI or Prime Brokerage research. References: [here](#), and [here](#).

	Net Gains in 2023 ($bn)	Net Gains Since Inception ($bn)	% of Total Net Gains Since Inception	End 2023 AUM ($bn)	% of AUM
Top 20 managers	67.0	755.4	46.1%	665.5	18.9%
Other hedge funds	151.0	882.6	53.9%	2,855.5	81.1%
Total of all managers	218.0	1,638.0	100.0%	3,521.0	100.0%

The multi-manager hedge fund platforms (more on them later) manage only about $300B in total (less than 10% of HF AUM), but are responsible for maybe 50% of the sector's PnL in recent years. They also employ about one quarter of the total HF employees.

Multi-manager funds

Hedge-fund industry
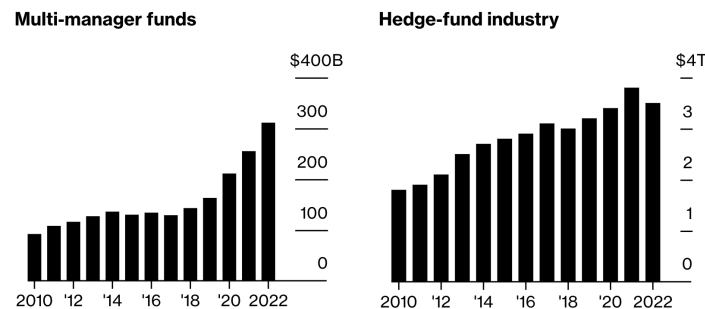
Headcount Growth at Hedge Funds
Number of investment professionals employed ('000s)
● Multi-manager   ● Other hedge funds
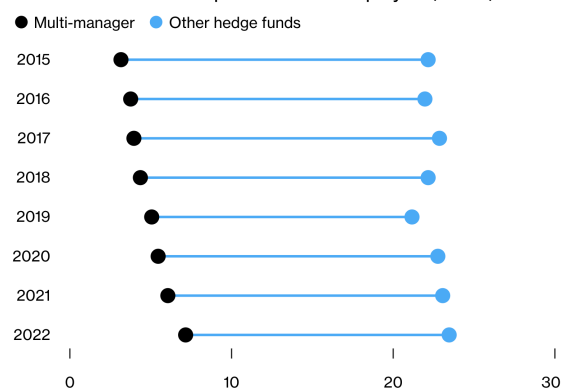
Source: Goldman Sachs Group Inc

All of this should provide sufficient evidence for the following three points:

1. Hedge Funds and prop trading firms are a niche sector.
2. Within this sector, the firms that are profitable and have a sizable headcount are a tiny niche.

3. And of course, quants are a sliver of the headcount.

Regarding the last point: the investment personnel in a hedge fund or prop trading firm ranges in the 30-50% of total headcount. Depending on the focus of the firm, quants make 30-100% of that. Most importantly, the job openings depend on the growth of the firm and the employee turnover; say 5-10% ballpark.

So, which are the very profitable hedge funds and prop trading firms that will hire at least a dozen quants every year? Note that the distinction is sometimes blurry because some prop trading firms are managing outside capital, and some hedge funds are investing or have opened prop trading divisions. A non-exhaustive list, with no pretense of being exhaustive:

- Balyasny
- Citadel
- Citadel Securities
- CTC
- DE Shaw
- DRW
- Element
- Exodus Point
- Flow Traders
- Headlands
- Hudson River Trading
- Jane Street
- Jump Trading
- Millennium/WorldQuant
- Optiver
- PDT
- Point72/Cubist
- Renaissance Technologies
- Susquehanna (SIG)
- Schonfeld
- Squarepoint
- Tower
- XTX
- Two Sigma
- Virtu
- Voleon
- Verition

And then there are many smaller firms that you may want to consider: Walleye, Headlands, Radix, Five Rings, Old Mission, Maven, etc. it's a very long, thin tail.

I would guess that the total number of investment professionals here is 15,000. So, maybe 7,000 quants? And a demand of 700 quants a year? That includes everyone, from alpha research, to portfolio construction, to data analysis, to execution, to risk management.

On the supply side, there is the top echelon of all fresh STEM graduates, plus all MS in finance from Baruch, Cornell, Chicago, Columbia, NYU, CMU etc; and all these sell-side employees on the verge of a nervous breakdown and trying to switch sides. I have no idea of the number, but it's clearly big, since half (~5,000) of my current LinkedIn contacts are in this class. Firms like to boast the selectiveness of their program, while at the same time advertising their outreach. Friendly, yet out of your league: investment firms are the Jennifer Lawrence of finance.
Looking at the advertised acceptance rates of firms is misleading, though. Citadel and the top prop trading firms boast a ratio job offers/submitted resumes of 0.2%. True, but also false, because they consider every single submitted resume. I have screened maybe a couple thousand resumes, with some of them being masterpieces of surrealist literature. If you are a piano player in a brothel, know that your chances are unfairly slim. But rest assured that your resume was counted in the denominator.

The Inside View

Before the interview

These are the steps you take in order to get an interview. Whatever I can recommend at this stage, it's beyond your control, or mine. Although thinking of it, I had a few high school juniors inquiring about comp packages and non-competes, which are borderline scary. But I would give the following practical advice.

1. Follow the target firms on social media: LinkedIn and X. Also, maybe follow a few Reddit channels (r/quant, r/algotrading), Discord, anything. Follow their job posting. Apply in a timely manner when they announce internship/externships, winterships, dog-and-pony shows.
2. Research your employer the way you would research a company you invest in. Be prepared and know specifically what they do and what they are good at.
3. Show up at the on-campus recruiting events, if they happen at your school. Attendance gives you brownie points. Back to #2: ask questions about the company.
4. Participate in a few extracurricular activities, like the local investment club etc. I personally find these clubs utterly sad, and the people attending them slightly check-the-box robotic (the kind of people who.. Follow my advice here? Sorry), but maybe I am wrong and they are actually good.
5. Subscribe to Matt Levine's "Money Stuff" newsletter; read his past articles too. They are informative, funny, and have aged well. They are free. They are just too long.

6. Read a few entertaining books for fun and profit: "My life as a quant", "Against the gods", "Red blood finance", "The education of a speculator", "The man who solved the market", "A man for all markets", maybe a Taleb book (but don't take it too seriously).

7. People ask brain teasers, and I can think for a couple of reasons. First, to probe *basic* modeling and math skills. Second, because it is a focal point: everyone knows they are a likely topic. So I am not testing your intrinsic ability to solve a puzzle, but your ability to *learn* about puzzles. And there is a pattern to puzzles, which can be learned. Work through all of Peter Winkler's books. And various firms, including Jane, IBM, etc. have puzzle sites.

8. Coding tests: I am not an expert and have never taken a coding test. I think at least going through the advanced tests on Codility and CodeRank may help. There must be books out there; suggestions welcome.

9. Applied probabilistic modeling and statistics are very important skills to have. Physics is still a good major to hire from, because it is a model-based discipline, as opposed to a technique-based one, and you will be exposed to many models. Take classes at the MS level. Read *at least* the following books:

   a. "All of Statistics" (both volumes) by L.Wasserman
   b. "Applied Probability Models" by S. Ross
   c. "Convex Optimization" by S. Boyd and L. Vandenberghe
   d. "Numerical Linear Algebra" by Trefethen and Bau
   e. "Linear Algebra and Learning From Data" by G. Strang
   f. "How to Solve It" by G. Polya

   Note I don't recommend any finance book. You'll learn on the job.

8. If you pass the coding tests, and get interview offers, try to interview with the least desirable places first, in order to gain real-life experience.

9. If you get an internship offer, you will not really work. You will be subject to a well-paid, seemingly-fun, effectively unproductive ten-week long interview. Like in any measurement process, as the firm sizes you, it will also be your chance to size the firm. Have fun and learn as much as you can about the firm and whether you'd like the job, but look beyond appearances. The internship is not representative of your future job.

Getting an offer

Top buy-side prop trading firms and hedge funds do not compete much on compensation. At the top, an alpha researcher will get a $450-500K package, inclusive of sign-up, salary and guaranteed bonus. Software engineers, execution research, risk, data, somewhere between 250K and 400K. Part of the comp differential is a reward for skills, and part is compensation for risk, and terms of employment. Regarding risk: the demands posed on signal researchers are that they produce signals. If they don't, in the long run either they are let go or the firm flounders and dies. Regarding the terms of employment: an alpha researcher may receive longer non-compete periods (between one and two years). These non-compete periods are especially costly for researchers, both because of foregone revenue, and because their competitive advantage will be eroded. Some general advice:

1. You have little bargaining power and your contract is standard, so there is no point in spending \$10K on a lawyer to review it. If you have multiple offers, compare the terms, check the glaring differences, and make up your mind.
2. Your first job is the most consequential in terms of influence on your future career path. In order of importance, learn about
   a. Job description: do you understand it? Is it what you want?
   b. Team: do you like your future manager? Will he/she/they be a good mentor?
   c. Do you like the firm's environment and culture? If you are unsure, you can ask the firm to let you chat informally with a few future colleagues. They'll say yes.
   d. Have the right personality traits for the job.

Two more heuristics:
1. Always think about the coming job *and the job after it*. Does it prepare you for your longer-distance goal? Your next job should be a mix of tasks you already know how to perform, and tasks you don't know how to perform but want to learn. Being greedy and thinking only one step ahead can make you stuck in a local maximum. n (>2) steps ahead seems too complicated, and missing too many data points. n=2 seems about right.
2. Compensation is very important. You are not applying for a job as Future Mother Theresa. But when thinking about compensation, consider its growth rate and the likely duration of your career. In other terms: next-job compensation is a constraint to satisfy, rather than an objective. Often, the most-paid job is not the most interesting or helpful in the long run. Another remark: non-alpha related jobs can be extremely intellectually satisfying. Thinking about data, execution cost measurement, optimization, risk–these are all very deep subjects and you can have a great and long career in any of those. The road to hell is paved with mediocre alpha researchers who did not achieve their goals and burned out by the early 30s. Maybe a life of purpose is not the first thing that comes to mind when working in finance but, as much as it is in your power, pursue it.

A Life as a Quant in Finance

Now you have a well-paying job that pleases your parents. What next? This is the most personal section and is based on a sample of one, rather ordinary, employee, so take it with a grain of salt. Maybe you should ask the really successful employees–the founders and hedge fund owners. But do so *very* carefully, since some of them are the love children of a schnauzer and Vlad the Impaler.

As a pet project, over the years I have asked many (many= 50-100) successful traders, algo developers and portfolio managers what makes a great analyst for their team. The answers have been remarkably consistent.

1. *Curiosity*. People who read articles and scientific papers on their own, maybe during weekends, for the sheer pleasure of finding things out.

2. *Creativity*. Like obscenity, hard to define but easy to tell it when you see it. I guess, something like this: looking at the same thing everybody can look at, but noticing something different, and proposing an original course of action. Most ideas do not survive scrutiny, but a few are brilliant.
3. *Humility*. When something does not work, admit it early and openly, examine the reasons why, and move on. In practice, humility (as described to me) is both willingness to take responsibility and openness to experience.
4. *Integrity*. Following the letter and the spirit of the rules– the team's, the firm's, the regulators'.

A couple of personal comments on this list. First, these qualities are highly correlated; even their definitions are overlapping. There is a single trait that explains maybe 85% of their occurrence. I can't say whether this trait is innate or cultural, but I am fairly confident that, by the time you join a firm as a researcher of some kind, either you have it or you don't. Also of interest: not a single person highlighted "capability" or "mental throughput" or "puzzle-solving" as a quality; and yet, we select in part on the ability to solve puzzles–go figure. In fact, many of the people I interviewed said that everyone is able to proficiently perform [task x] or work hard to execute instructions. Also, not a single person mentioned soft skills like empathy, communication skills, etc. Indeed, some of the very best investors I know, while being very good people deep inside, have the social skills of a thermonuclear reactor. Finally, every single manager I have interviewed see their employees as *researchers*, not soldiers or doers of some kind[2].

Assuming you do have all of these qualities, you may want to add some structure to your life as a researcher, in order to be more effective.

1. Let's start with the masters. Read the following three essays. They are short and full of useful advice.
    ○ [You and your research](#) by R. Hamming[3]. This is the most practical of my recommended reading. Please read this over and over again. Favorite sentence: "*I started asking, 'What are the important problems of your field?' And after a week or so, 'What important problems are you working on?' And after some more time I came in one day and said, 'If what you are doing is not important, and if you don't think it is going to lead to something important, why are you at Bell Labs working on it?'* "
    ○ [Real-life mathematics](#) by B. Beauzamy. By a mathematician doing actually applied mathematics. Favorite sentence: "*Real-life mathematics [does] not require distinguished mathematicians. On the contrary, it requires barbarians: people willing to fight, to conquer, to build, to understand, with no predetermined idea about which tool should be used.*"
    ○ [Ten lessons I wish I had been taught](#) by G.C. Rota. Although this is a bit more academic, it is extremely useful. For example, the first item is on "lecturing", but it's

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[2] Maybe this is a good time to recommend a book on this subject: "The Scout Mindset" by Julia Galef, which explores the differences between explorers and soldiers.
[3] If you have time, read "The Art of Doing Science and Engineering: Learning to Learn" by the same author.

really about communicating ideas effectively. Favorite lesson (from Feynman, actually): "*You have to keep a dozen of your favorite problems constantly present in your mind, although by and large they will lay in a dormant state. Every time you hear or read a new trick or a new result, test it against each of your twelve problems to see whether it helps.*"

2. You can be successful (especially as an alpha researcher) in one of two ways. First one: you identify a completely new opportunity. Example: Gerry Bamberger at Morgan Stanley in the 80s developing statistical arbitrage. Also in the 80s: the early index rebalancing strategies, and convertible arbitrage. The second one: you apprentice in a team that has a successful strategy, learn the trade, and improve it marginally. Unsurprisingly, the overwhelming majority of successful traders belong to the second class. The lesson: try to join a team and a firm that has a habit of being successful. Don't think you can make a huge difference, and don't fall for the poetry of the underdog.

3. Relatedly: since you are an apprentice, get a mentor or two; people who are good potential role models because of their career paths and how they got there. Learn from them, ask for advice, keep in touch, thank them. And years later, if they need your help (it can happen), offer it before they have to ask.

4. Develop your research agenda.
   ○ Write down your open questions as soon as they appear, and then organize in a document. You may even have a research agenda that is not strictly related to what you are doing at work.
   ○ Based on the questions you have, search for papers on ArXiv and SSRN (organize RSS feeds), scan literature digests, past and present, provided by sell-side research orgs; and a few target academic journals.
   ○ Read at least a paper a week. Start with the intro, skip the literature review section, go straight to the result statements, and if they are interesting, read proofs and experiments.
   ○ If you found an old paper useful, search on Google Scholar the most cited papers that cited that paper.
   ○ Every month ask yourself what you have learned the previous month, quarter, and semester, both on the job and in your broader research endeavor. Write those down. You can use a tool like [Anki](#) to memorize the main points.
   ○ Collaborate and exchange ideas. Don't be paranoid. No one is going to steal your idea. The real risk is that they will not even listen to you.
   ○ Talk to and learn from people with complementary skills to yours.

5. Finance researchers are, understandably, very conservative. Failure is risky, and there is some downside protection in following established recipes. As much as is reasonable, *question everything*. If something still does not make sense after repeated questioning, you have found an area of research. One reason why 90%+ of traders and portfolio managers are only marginally successful (in addition to having had poor mentors–see above) is that they stopped asking uncomfortable questions.

6. Develop early on a map of the existing relevant data sets in your area. Because you will be joining an existing group, this should not be too hard to do. Then, to make progress, ask the questions:
   - What data would be nice to have?
   - Which entity has the data or some proxy? Maybe they don't sell them but they could?
   - What would you do if you had this data? Would your approach change, or would you just scale the existing approach?
   - Make the data science department your best friend.

A final and non-strictly professional piece of advice: you will spend more time working with your colleagues than with your partner or spouse or family. So make this time meaningful by making your work relationship meaningful by sharing a strong common purpose with your colleagues, and then by pursuing it in the best possible manner. The most accumulated wealth from having worked at several firms will not come from your W-2s, but from the relationships and friendships you will have developed along the way.

Jordan Boslego-PMD

At BAM since 2021

Equity Research Group: 4
PMD: 3+ 1 Corbett + 2 EU+Asia=6. For 70 PMs (11PM Asia, 11PM EU) +1 quant dev + 1 engineer + 3 hedging

50% of time is business-facing
1. Use risk model
2. Educate on attribution and decomp
3. Analyze performance
4. Best practices
5. Intermediate on risk infraction

Use modified Axioma, with selective overrides. Custom model: correct for leverage factor and other factor description; model contains crowding. Reweight of the universe. Industry reclassification, but staying at level 3 GICS.

People are ok with the model. Issues: industry classification occasional issue. They are pretty liberal with exceptions.
Factors: appreciated, sometimes too many factors.
Performance Attribution: standard + idio specialized decomp (sizing + selection), crowding and earnings.
They have a research agenda: 80 ideas.
Research idea: capital allocation.

Wanted by PMs: Stress Testing, Better attribution

Why the underperformance? PMs that were not good. Capital allocation. Market impact: CLB.Igor Surlin, reporting to Rahul.