**HW7: Quants in Utopia**

**Please describe the legal structure and operational model of a typical hedge fund.**

    Hedge funds are alternative investments that use pooled funds and employ numerous different strategies to earn active return for their investors. They have a higher level of discretion and flexibility over investments than other asset classes. However, hedge funds also have lower levels of disclosure of liquidity pressure. According to Investopedia, a hedge fund is an “investment partnership” where investors pool their money to invest in various securities such as stocks, bonds, commodities, and real estate, but can invest in anything under their mandate. The difference between hedge funds and mutual funds is that mutual funds are typically limited to stocks and bonds. Because of the inherently risky investment strategies typically employed by hedge funds, they are only open to qualified investors of net worth of greater than $1 million or annual income of greater than $200,000 for two years.  Hedge funds also invest borrowed money, which greatly increases their risk. Hedge funds make money by charging an expense ratio fee on the initial investment as well as a performance fee on the gains. The typical fee structure is known as “Two and Twenty,” meaning that the fund would take 2% of the initial investment and 20% of the generated gains. (A)

    Another reason that hedge funds are inherently risky is that they are typically not as liquid as other investment options like mutual funds.  Hedge Funds seek to generate funds over a set period of time, called a lockup period, in which you cannot sell your shares. (B)

    The legal structure is vaguer, as hedge funds are less regulated than mutual funds in that they are not “subject to some of the regulations that are designed to protect investors,” according to the SEC website. “Depending on the amount of assets in the hedge funds advised by a manager, some hedge fund managers may not be required to register or to file public reports with the SEC. (They are), however, subject to the same prohibitions against fraud as are other market participants, and their managers owe a fiduciary duty to the funds that they manage.” (C)

    The marketing of interests in a hedge fund is regarded as a security offering under the Securities Act of 1933 (the “1933 Act”). The manager of the fund, as an investment adviser, is governed by the Investment Advisers Act of 1940 (the “Advisers Act”). And the Fund itself is subject to the Investment Company Act of 1940 (the “Company Act”). Absent exemptions under these securities laws, the offering, manager and fund would have to be registered with the SEC – a costly and time-consuming process. Fortunately, exemptions under these laws allow both the offering and the fund to avoid the cost, administrative burden and disclosure requirements imposed by registration. Additionally, the manager to one or more private funds may avoid SEC registration if it advises private funds with less than $150 million under management. Each state also has its own laws relating to the offering of hedge fund interests and the registration of the manager, which will also need to be navigated. (D)

**What specific elements or characteristics formed the foundation of the Quantopian community? What are the incentives or motives members are given to encourage active participation and contribution? Suppose you are a member of Quantopian. Would you be willing to share your source code or answer other members’ questions?**

    The foundation of the Quantopian community was based simply on the opportunity within the financial services industry to leverage today’s technology.  Like Jon Kafton and Cloud9Trader, John Fawcett recognized this opportunity and founded Quantopian to reduce frictions in the industry like information hoarding and high barriers to entry like getting a job on Wall Street and having an Ivy League education. He broke down such barriers by opening an open source platform and leveraging the talents of amateur traders. Quantopian’s “cornerstone” was its ability to eliminate the lag time in algorithm development through the creation of a solid backtester and its community from which to crowdsource algorithm wisdom.  The prototype “Zipline” attracted many talented developers because it was built on Python, the programming language of choice, its realistic backtester that accounted for brokerage fees and market conditions, and the crowdsourcing feature, which allowed for comments and discussion around the improvement of algorithms. The main incentives for members are ease of use, educational purposes (since you can continually back-test and update/improve your algorithms), retaining copyright of material you create (after 400,000 contributions), and 10% of all profits generated using your algorithm.

    If I were a member of Quantopian, I would probably not share source code or review other’s algorithms unless it served my own purposes like improving one of my own algorithms. This is simply because it seems like you are in somewhat of a competition with other developers to create the best algorithm and generate the largest gains. In “Trading Places – The Rise of the DIY Hedge Fund,” Quantopian is compared to Kaggle, but I think of the crowdsourcing feature more like StackOverflow. I leverage the knowledge from that site all the time, but I have never contributed because I see no benefit from that. The only way in which I can see myself substantially contributing is if comments and posts count towards the 400,000 contributions and I was trying to retain the copyrights to my algorithms. On another note, I have submitted contributions to Kaggle because I am an amateur developer and am using the site just to boost my skills and have no hopes of winning money in competitions.

**How important is the quant community for Quantopian? What efforts has Quantopian made to grow this community? What other approaches could you use?**

    The community aspect seems to be a major differentiator for Quantopian in the market. Fawcett credits this attribute as one of the main reasons for Quantopian’s growth against its direct competitors, and I believe he is correct. The community legitimizes the site as well as encourages personal development. By seeing what other quants have tried, it may assist in idea generation and algorithm improvement. One way that they tried to grow this community was through Quantopian Open, an algorithm competition open to the public, in which $100,000 of real money would be invested in the top algorithms and gains going to the winner. Quantopian also increased its brand awareness by running a conference, presenting at top universities, and organizing local meetups. These efforts proved successful as the community grew more than 185% in less than 3 years.  I strongly agree with the growth approach taken by Quantopian. I think that scholars are always excited to leverage the next technology to break into new markets, and Quantopian offered just that with little barriers to entry for the amateur developer, so I think that attending conferences and presenting at top universities was an excellent idea. I think Quantopian could further expand this strategy by including more schools in the network, attending other conferences within the trading and software development industries, and utilizing its Quantopian Managers Program as potential ambassadors.

**What “frictions” or inefficiencies a quant crowdfunding hedge fund is trying to solve? What are the advantages and pitfalls of such crowdsourcing? When is crowdsourcing better or worse compared to professionalism?**

    The theme throughout several of these articles is that trading used to be a profession reserved for a select few people who could make it through a very stringent interview process, which typically required a resume with prestigious universities and internship experiences. This candidate pool typically does not produce a group of diverse perspectives. There became an opportunity to open a platform to amateurs when the technology was built to thoroughly test algorithms before putting said algorithms into production. So, one friction solved by this new type of hedge fund is accessibility. Another friction that it solves is the “black box” nature of investing in a hedge fund. Previously, investors had minimal insight into how investment decisions were made and had to blindly trusting a fund manager’s claimed results. Now they had factual evidence on which algorithms performed well, how well, and how they compared to other algorithms, decreasing the imbalance of information and increasing investor confidence. With Quantopian’s model, people invested only in a trading strategy with outstanding and trustworthy backtest results. The investment process also became more transparent, boosting investor confidence.  Another way that Quantopian was able to reduce risk was diversification. They had a large algorithm pool, so they could diversify across numerous algorithms, using different approaches. This allowed them to reduce systematic risks, like over-investing using similar strategies. This is what had killed LTCM as a quant hedge fund.

    The talent pool for trading became much broader, as people could experiment with trading on their own and have a portfolio to show for their work. The gate was opened for quants who wanted to make money for their own ideas, as well as for engineers, university students, researchers and other non-professionals who were interested in becoming quants.

    Quantopian could reduce both the operational risks, as well as the cost associated with traditional hedge funds. Quantopian did not have to hire full-time quants with a lot of uncertainty of their abilities. They did not have to rely on these full-time hires to develop profitable algorithms. Quantopian instead only signed contracts with quants whose algorithms had been carefully tested and benchmarked alongside numerous other algorithms. This lowered the risk of hiring incompetent quants, therefore minimizing the costs associated with such hires. Additionally, the costs of hiring quants on Wall Street was much higher than what Quantopian would have to pay out of their 10% net profit rule. For example, Citibank paid its quantitative analyst in New York City an average annual salary of $148,000 regardless of their competency in producing profitable algorithms. In contrast, using Quantopian’s 10% net profit rule, an author of an algorithm that was allocated $5 million and achieved 15% annual return would only cost the hedge fund $75,000 a year.

    The advantages of crowdsourcing are the sheer amount of information gained from the crowd can allow you to find the major commonalities, or truth, and weed out the noise. Another advantage is diverse opinions. The pitfall is also in the amount of data, as it can be overwhelming and sometimes inconclusive. You are also subject to opinions of non-experts, which could be potentially dangerous when investing money.

**Do you think Quantopian’s crowd-wisdom model is a disruptive innovation to the existing hedge- fund industry? Do you think such model can survive or perhaps even growth into a major player in the hedge fund industry?**

    Yes and no. I think the technology improvements and crowd-wisdom of algorithm developers is an invaluable addition to the trading industry but will never completely replace traditional fund managers and experts because of the importance of industry-specific knowledge, accountability, and unpredictability of the market crossed with limitations of machine learning. Algorithms and machine learning are very good at picking up patterns, but it doesn’t work when there is no real pattern, or when the pattern requires data inputs outside the scope of the application. For example, stock fluctuations often reflect changes in public opinion, news stories, etc. in real time, and there is no way for an algorithm to incorporate all such information in real time. (The Future Is Bumpy\_ High-Tech Hedge Fund Hits Limits of Robot Stock Picking - WSJ.pdf)

    The good parts about Quantopian’s crowd-wisdom model are that it is cheaper labor and less overhead investment so that it can easily be scaled back in unfavorable market conditions. It also hasn’t been tested in all market conditions, which is one argument against it. A challenge of Quantopian’s crowd-wisdom model is that their community members were of varying, and sometimes low-end, ability. The majority of Quantopian’s members were amateurs and without enough talented quants, the community would become stagnant and its algorithms uncompetitive.

**QuantConnect, Quantopian’s direct competitor, also founded in 2011, appears to have better technical performance, more comprehensive data coverage, and comparable fees. Why did QuantConnect not grow as quickly as Quantopian?**

    QuantConnect had a different revenue model than Quantopian. They provided free basic backtesting services and charged a monthly subscription fee for executing trading algorithms via a virtual private-server service. I think their revenue model is why they were not able to grow as quickly as Quantopian. Quantopian offered a freemium model. Quantopian offered most of their services for free, such as backtesting and access to many databases. They only charged subscription fees for premium databases. They also charged a fee for their hedge fund, that was similar to other hedge funds, 1% of AUM + a performance based fee.  As a result, many amateurs can get access to databases for free and create their algorithms. This allows them to get started without having to pay a subscription fee. As algorithms get more advanced, broader data feeds are needed and this is where the premium databases came into demand. I think that this free layer allowed Quantopian to grow its users more quickly because amateurs aren’t going to want to pay before they know how their quant capabilities perform with real market data. Additionally, amateurs that don’t yet need access to premium databases can create and test algorithms for free and even have the chance at earning money without having to pay a subscription fee for executing algorithms.  I think that the differing revenue models were a major reason that Quantopian grew much faster than QuantConnect.

    Another reason Quantopian was able to grow more quickly, was that they used the Quantopian Managers Program to discover talent and experiment with their own hedge fund. This provided more incentive for users, as well as gave Quantopian an additional asset. Quantopian was able to exploit the talent pool of its growing community.

**How do you evaluate Numerai’s unique crowd-wisdom model? Which model do you think has the greater potential to grow into a major player?**

    Numerai had a different crowdsourcing model than Quantopian.Quantopian crowdsourced algorithm development.  Numerai crowdsourced predictions with data analysis. Users on Numerai developed their own prediction with a “training dataset” that is provided by Numerai. Users then applied their model to predict events with all the inputs from another “tournament dataset”. They used known outcomes to evaluate a model’s predicting power. Depending on the model’s ability to predict these known outcomes, Numerai determined whether they would utilize the model to predict remaining unknown events. The greater the predictive power, the more monetary award the author of the model could claim. They did not disclose any information about their models, contrasting to Quantopian’s open discussions. They also did not disclose the real meaning behind each training and tournament dataset. Another reason that Quantopian’s model may have a greater growth potential is that their algorithms are evaluated using a variety of evaluation metrics, only accuracy of the predictions ( numbers ranging from 0 to 1) were evaluated in Numerai. Their approach leverages crowd wisdom while also ensuring member privacy and intellectual property ownership. Numerai winners are compensated with the companies own cryptocurrency.

    I think that Quantopian’s model has more potential to grow into a major player. I think that this is mainly the case because of the way that contributors are compensated. The best algorithms are allocated real money to invest and then the user gets 10% of the return. In contrast, Numerai users are given Numerai cryptocurrency. Additionally, the way that users are presented with data is different between the two services. With Numerai, the data scientists working on the platform do not know what the data represent. I think the transparency of the data on Quantopian will help it to have greater growth potential. However, an advantage that Numerai has is that data scientists do not have to share their code and therefore have more privacy and intellectual property ownership. Each data scientists code and predictions stay their own and this could serve as an advantage for Numerai.

**Which strategic options would you choose to pursue in the future if you were to lead Quantopian?**

If I were to lead Quantopian, I think the strategy going forward would be to stay the course and continue to focus on the core idea that has gotten the company this far. Some improvements can be made and efforts can be had to increase the quantity and quality of the user base. I don’t think disappointing performance in one or two quarters should deter the future focus or lead to any drastic changes. Quantopian is still an industry leader in quantitative hedge funds and its crowdsourced strategy is a good one. I don’t think going away from crowdsourcing is the way to go. One potential option to consider would be to increase the compensation for winning algorithms, for both the allocation and the percentage returns on profits gained from the algorithm. They could double the allocation to $200,000 as well as the earnings return to 20% rather than 10%.  Even if they cannot increase the allocation to each algorithm, just increasing the earnings return % would help to bring in more experienced quants, since they have to compete with quant salaries on Wall Street. This could help to bring even better talent to the user base, and with more and better algorithms being submitted, eventually they’ll see better overall performance of the hedge fund. Another option that I would pursue if I were to lead Quantopian would be to give intellectual property rights early, maybe at 250,000 instead of 400,000 contributions. This would help them to better compete against competitors like Numerai. Additionally, if I were Quantopian I would look at how I could capitalize on users using my platform to find better employment. This could include partnering with companies looking for talented quants and helping them connect with employers. While this could lead to competition, it could also bring in more talented and qualified users building algorithms that Quantopian could then use to make money. I would also try and work with institutes of higher education ,so that students studying in quant field could use Quantopian as a way to learn and develop skills for their courses.

Sources:

A <https://www.investopedia.com/articles/investing/102113/what-are-hedge-funds.asp>

B <https://www.barclayhedge.com/what-is-a-hedge-fund/>

C <https://www.sec.gov/fast-answers/answershedgehtm.html>

D https://www.riveleslawgroup.com/launching-a-hedge-fund-legal-and-practical-considerations/