Fintech HW6: Quant Investing

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

Hedge funds are alternative investments which use pooled funds that employ numerous different strategies to earn active return, or alpha, for their investors. Higher levels of discretion and flexibility over investments but lower levels of disclose or liquidity pressure are two characteristics of hedge fund compared with other asset classes.

Legal structure

A fund was usually founded by one or more general partners (GP), who had extensive experience and broad social connections with related parties, such as law firms and brokerage firms. Interested clients invested their money and became limited partners (LP) of the fund. GPs and their fund managers raised capital from high-net- worth clients and institutional investors. Direct sales, either through investor engagement with management staff or the fund director's own marketing channels, was still the primary method of fundraising.

If nailed down further for analysis, typical hedge funds have structures of organization, fee and term.

From an organizational standpoint, hedge funds have a two-tiered organization. The limited partnership model is the most common structure for the pool of investment funds. In the limited partnership model, the general partner is responsible for selecting the service providers that conduct the operations of the fund. Limited partners can make investments into the partnership and are liable only for that amount. The other element is the arrangement of the general partnership. Selecting service providers to market and manage the fund, performing functions necessary in the normal course of business are all general partner's responsibility.

As for fee structure, generally speaking, hedge funds have higher fees than mutual funds. There are management fees as well as incentive fees. The typical hedge fund fee structure is a management fee of 1% to 2% of assets plus an incentive fee equal to 20% of investment profits beyond a stipulated benchmark performance, annually.

Term structure is normally formed based on underlying strategy being used by the manager and the settings for "lock-up" commitment. The more liquid the underlying investments, the more frequent the subscription or redemption terms should be. "Lock-up" commitment could be a hard one or a soft one, which mainly aims to prevent the investors from withdrawing funds for some period.

Operational model

Two important factors for a hedge fund's basic business operational model are fees and fixed expense, for based on which, there are three models for hedge funds. First is the one that keeps their fixed expense lower than their management fee revenue. Such funds have a margin of safety built into their model and

can withstand dif cult market environments. They are better positioned to navigate through downturns and therefore have higher survival rates over the long term. Second is the one which spends more than their management fee but less than their realistic performance fee expectations, requiring some degree of positive performance revenue to stay profitable. The third is the one which may be forced to take drastic, unplanned actions during soft-performing years, and is dependent on outsized performance to cover its expenses.

(b.) 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?

One of the accomplishments that Quantopian has achieved is a vibrant community consisting of quants.When working properly, Quantopian could effectively exploit the talent pool of its growing community for still greater financial gains.

Its community has relied on some key items to be successful, or in another word, to attract members as well as to encourage active participation.

Formed from Quantopian core belief, crowd wisdom as opposed to proprietary development, Zipline attracts best quants for the fact that it was designed as an open-source Python package from the very beginning and it leverages suggestions and contribution from hundreds of developers.

In addition, both online and offline initiatives have helped increase membership and community.For example, its monthly contest, Quantopian Open, has motivated quants financially. The algorithm with the highest score at the end of the month would be allocated US$100,000 in real money over the next six months as a reward, with all profits generated by the algorithm during the third stage going to the winner. Also the professionalism and seriousness of Quantopian Open have built confidence for more quants to join the community.

There are many incentives for members staying in Quantopian. Other than profit-targeting motives, there is still pursuit of open community. If I were a member of Quantopian, I would be willing to share my source code or answer questions. Essentially, what differentiates Quantopian community from traditional finance industry is its openness instead of keeping secrecy. Even though the underlying profitable algorithm is private and exclusive, as fund size and profits potential are still negligible compared to regular hedge funds, it hasn't serious enough to disincentivize sharing source code or answering questions.

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

Importance

Quantopian is web-based platform that allows professional dn amateur quantitative traders to develop, test and execute their strategies. Quant community is the exact place where free data is provided and quants could write and test their own algorithms as well as the place where the talent pool could be effectively exploited by Quantopian for greater financial gains. . It is also the exact place where Quantopian core values are shown, which is belief on crowd wisdom

Efforts

Quantopian has conducted brand building as well as both online and offline events to grow the community. Professionalism brand image built through design of events has attracted high quality quants to join the community. Several contests as well as in-person meetups in numerous cities are beneficial for attracting more members.

Other possible approaches that could be taken include tapping into higher education and developing into a mini-Linkedin. Quantopian could leverage its user-friendliness and its current influence in some universities to tap into higher education, developing teaching and assessment tools and packages, which potentially motivates more members to join in even if their initial motivation is not to become a quant. To extend its function for candidates to show their abilities for better employment and further develop into a mini-Linkedin is another way for Quantopian to grow its community. Becoming a human-resources platform for quants and professionals could add more diversities to the current community and also motivate quants to develop better algorithms.

(d.) 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?

Solutions for frictions and inefficiencies

Crowdsourcing means that business operations could be outsourced to a large population of unknown people, particularly through online channels, which essentially is distributed problem solving. Quant crowdfunding hedge fund is designed to solve problems related to traditional typical hedge fund as continual pressure has been faced by existing hedge-fund model. Asset growth and talent management were the main challenges.

It solves the challenges through crowdsourcing algorithm development from its community as well as proper reward both financially and intellectually for quants as motivation.

Advantages of crowdsourcing

For investors, transparency elevates investors confidence. To investors, algorithms and their trading strategies were no longer a black box. Backtesting and out-of-sample paper-trading results were available to investors and could be compared. With Quantopian's model, people invested only in a trading strategy

with outstanding and trustworthy backtest results, instead of seeking potentially talented hedge fund managers who claimed superior returns with self-generated backtest results.

For common quants, Quantopian makes it possible for people who aspired to become quants with offers of data, tools and platform. Through this channel, the talent pool for quant hedge fund developers became significantly wider. Facilitated by Quantopian's easy-to-use coding platform and open community, anyone who had an interest in algorithm trading could easily learn the basics of programming and finance, develop an algorithm, and make money with their own talent.

For Quantopian itself, this crowdsourcing could reduce the operational risks and costs of traditional hedge funds. Instead of hiring full-time quants and, with much uncertainty, relying on them to develop profitable algorithms, Quantopian's crowdsourced hedge fund only signed contracts with quants whose algorithms had been carefully tested and benchmarked alongside numerous other algorithms. The risk of employing incompetent quants was therefore minimized and the costs associated with such employment significantly reduced.

Pitfalls of crowdsourcing

Easy access of Quantopian makes it exposed to low quality of community members. Some members lack deep understanding of financial markets which is required when constructing a feasible and profitable strategy. The platform may be stagnant because of lack of enough talented quants.

Relatively small award to each algorithm compared with salaries offered by Wall Street may lose attraction for quants, which potentially lose real talents for a better and high-quality community.

Crowdsourcing also has its internal contradiction, which happens between pursuit of open, sharing community and individual's profit-taking motives. Especially when scalable and substantial, these problems may not be trivial as usual. Another issues related to this is the difficulties of leveraging crowd wisdom while ensuring member privacy and intellectual property ownership.

Another pitfalls involved here is unethical behavior because of weak control over authors by Quantopian.

Comparison with Professionalism

Crowdsourcing is better when the hedge fund problem is simple, which doesn't require talents that are too advanced and it helps to reduce costs compared with traditional investment professionals. And crowdsourcing in this case could improve productivity and creativity.

Professionalism outperforms when the task is difficult and even requires collaboration between members. Crowdsourcing members essentially compete with each other while traditional top-down organized institution presents more chances for talents to collaborate to solve the problem.

(e.) 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 grow into a major player in the hedge fund industry?

First, I think this crowd wisdom model is a disruptive innovation due to the advantages as follows:
1. By developing the crowdsourced algorithm development from its community instead of hiring people from top universities and financial institutions, Quantopian could reduce the operational risks, as well as associated costs.
2. The transparency of the investment process would certainly boost the investor confidence that was critical for hedge funds.
3. They opened a gate for thousands of quants who wanted to make money on their own idea and widened their talent pool.
Besides that, according to a sample of 120 art projects on Kickstarter, a group of invited experts often converged on similar funding decision and the crowd wisdom can help avoid that and therefore makes a crowd of unknowns perform even better than experts.

Based on the points above, I believe this kind of model can survive in the market, however, I don't think they would become a major player in the hedge fund industry due to these reasons:
1. The transparency of the strategies would lead to more exposure of the algorithms to the layman investors. Those investors are more speculative and often underestimate the risk of investment due to a lack of professional knowledge. If they just follow up the top return strategies, the total variance of the market would increase since they augment the volatility. This would make it much easier for the institutions to take advantage of that and make money by on purposely triggering some certain threshold in the strategy o purposely.
2. Compared with the wall street, this kind of crowd wisdom platform pays much less. So once someone became famous on the platform, it is likely that they would be offered a high salary and keep his strategies in secret in order to make money for the bankers. This is the internal contradiction between pursuing of open, sharing community and individual's profit-taking motives.
3. Speaking of the investment market, ordinary individual investors only make up a small share of the market. The large majority of the market is the wealth management teams of really rich people. For those people, having some investment advisors that they can discuss the strategies with instead of believing some unknowns' strategy is often not a reasonable choice.

Therefore, this kind of disruptive innovation of crowd wisdom model would lead to a more transparent environment of quantitative finance and lower the requirement of doing individual investment but can't become a major player of the market.

(f.) QuantConnect, Quantopian's direct competitor, also founded in 2011, appears to have better techni- cal performance, more comprehensive data coverage, and comparable fees. Why did QuantConnect not grow as quickly as Quantopian?

In my opinion, that is because of the advertising strategies and the development environment.
1. Development environment: *QuantConnect*, with its C# infrastructure, is much faster than the python based *Quantopian*. However, this also means that a programming language with JIT like C# is much harder to learn than python, which is much easier in language grammar. There are much more user for python and therefore it is more easy for *Quantopian* to grow. The difference in technical performance due to the speed is not a core concern for most layman investors.
2. Cost: *Quantopian* adopts a freemium charging model which is free to use the basic function of the platform and only charged subscription fees for premium databases. Compared with *QuantConnect's* $20/month fee for the executing trading algorithms, the free one would certainly grow faster and gain more users.
3. Community building activities: *Quantopian* focused much more on the community building activities. They hold online contests as well as offline meetups, which really helps the grows of the user community and lead to more communication. Some winners of the Quantopian Open even willing to shared their winning codes with the community. This kind of community building activities fostered the growth of user group and improved the quality as well as the quantity of the strategies and make it more attractive to new users, which leads to a virtuous circle.

(g.) 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, founded in 2015, joined this trend but with an entirely different approach. Unlike Quantopian, which crowdsourced algorithm development, Numerai crowdsourced predictions with data analysis. Specifically, Numerai users developed their own prediction models, such as the logit regression, to predict an event, such as an increase in the Apple stock price, with a "training dataset" Numerai provided. Users then applied their models to predict events with all the inputs from another "tournament dataset." Numerai intentionally inserted some past events with known outcomes in the "to be predicted" column, and used these known outcomes to evaluate a model's predicting power. Depending on this predicting power, Numerai determined whether, and to what degree, it would utilize the model to predict the remaining "unknown" events. The greater predictive power a model had, the more monetary reward the author could claim.

As opposed to Quantopian's open discussions, Numerai users did not disclose any information about their models. They only needed to submit the predictions—numbers ranging from 0 to 1 indicating probability— calculated from their models. Numerai did not disclose the real meaning behind each "training dataset" or "tournament dataset." This approach leveraged crowd wisdom and at the same time ensured member privacy and intellectual property ownership.

I think Numerai's model has the greater potential to grow into a major player. One big difference is that Numerai's model leveraged crowd wisdom and at the same time ensured member privacy and intellectual

property ownership. When people make a lot of money and get rich, they don't want to exposed to the public. And if some important people get enough money of Quantopian, they may quit and go dark so that Quantopian will lose a very important modeler and this will not happen to Numerai's model. So I think Numerai has the great potential to grow into a major player.

(h.) Which strategic options would you choose to pursue in the future if you were to lead Quantopian?

I think there were momentous possibilities for the Fintech startup. If I were to lead Quantopian, I would diversify and shift away from its crowd-wisdom hedge-fund model.

Quantopian provided a common ground for quant traders to evaluate their trading algorithms. It had developed a comprehensive scoring system with several performance metrics for different algorithms. With the increasing popularity of algorithm trading and the ever-growing popularity of its platform, it's possible for Quantopian to transform into a rating agency for all quant hedge funds, like Morningstar.com for mutual funds. Also, it could act as a sales platform for quant hedge funds, with the unique rating algorithm, I believe Quantopian could earn a large amount of commission by selling quant hedge funds.