Details of Research Experience

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Here are the material descriptions of research experience in my CV. I summary some of my research experience and upload the supporting material in the Github (https://github.com/Pomelo-Yz/Details-of-research-experience) in order to provide more information and mitigate information asymmetry. You can find each responding material about experience in Github.

1 Tsinghua PBC (2021.07-Present)

This folder contains the summary of my experience as a research assistant of Professor Zhou. Since Professor Zhou had finished the theoretical model part, another PhD student in Tsinghua and I were responsible for the empirical part of this project *Bank Failure and Implicit Guarantee: Chinese Experience*. Generally, the senior PhD student would give me some specific tasks, and then I processed the data or wrote a report to discuss with the senior student. Next, I waited for the feedback from the discussion between the senior student and the Professor Zhou. While I waited for the feedback, I did not waste the time and read some interesting papers in asset pricing. These were recorded in the folders *Empirical Asset Pricing* and *Asset Pricing Model* respectively. Now the main body of this project are finished and I am assigned by Professor Zhou to do other work.

1.1 RA job summary

This subfolder contains some of my research and programming reports. I mainly helped to do two kinds of jobs. The first job was to summary the key point in the top journal and wrote the report, such as searching the measures or proxies for bank competition and bank liquidity. The second job was to process the data. For example, I imported the stock data and balance sheet data of 40 listed bank in China from the Wind database and then deal with the abnormal and missing value. After reading the method in literature, I used the quantile regression to calculate the systemic risk and solved the non-linear equation to get Merton distance to default. I just put my work into this subfolder and this paper now may be a little unrelated with the previous work. In this project, I learnt a lot from the senior student and Professor Zhou.

These reports are writen in Chinese for communication efficiency.

1.2 Empirical Asset Pricing

Since I don't have a good command of the empirical method in asset pricing before and the senior student is taking the course empirical asset pricing, I require the homework (i.e. course assignment) from him to practice myself. The first assignment is to replicate the three factors model to replicate the paper of Fama and French (1993), where I learn how to use WRDS. I merged the CRSP and Compustat database and construct the size and book-to-market factors to replicate the regression coefficient and R square in the 25 portfolios. The second assignment is to replicate table 6 the paper of Jegadeesh and Titman(1993), which is about market efficiency. I examine the excess return of momentum strategy in American stock market in the period of 1963-1990 and 1990-2020 and also

compared the excess return in different size and beta group (small, medium and big). Furthermore, I used data in csmar database to examine the conclusion in China.

I replicate the papers by Python and the replication can be found in this subfolder (*Empirical Asset Pricing*). The programming reports are exported with the format as html.(*Fama French (1993) Replication.html, Jegadeesh and Titman (1993) Replication.html*)

1.3 Asset Pricing Model

I am also interested in the asset pricing theory and read the famous paper intermediary asset pricing recently. Since I get used to write down some key words or type down in Latex, some records are reserved. I see the numerical experiment in this paper is also important, so I also download the code from AER website, but I don't have enough time to replicate this paper so far. I think I will have better understanding of the parameter calibration of model after replicating this paper. I also read some papers about macro-finance and based on these papers to write my research proposal.

This subfolder contains some my notes about the papers which include the asset pricing model.

2 Department of Finance (SYSU)

In my second year, I passed the interview and was recruited as a research assistant of Fintech Big Center Data of my college. During the first semester of sophomore year, I mainly learnt and listened to reports by the PhD students in the seminar. To change the passive situation, I taught myself lots of knowledge in my holiday. Then, a PhD student in his third year (now in fifth year, the first author in the following paper) led me to carry out research and I learnt how to begin research as a RA. His research was complex networks and knowledge maps in machine learning, so we were exposed to financial network.

2.1 Alumni social networks and hedge fund performance Evidence from China (2020.03-2020,06)

The big data center has a cooperation relationship with Shenzhen Fund Association, so we can receive the hedge fund data. This unique hedge data makes our research different from previous research, which used the public mutual fund data. I helped the PhD student to process data and construct network. One challenge of this research is data processing. The quality of data is extremely low in some data lists and this data is full of abnormal values. In June 2020, I went to prepared for my final exam in the spring semester of my second year and the econometrics part was done by senior PhD. The main reference is a paper in JFE. In fact, I also learnt a lot in this RA experience, such as how to propose my ideas, which could guide me to research independently.

The folder (*Department of Finance*) contains the paper.

2.2 Systemic Financial Risk Review: Measure And Contagion (2020.09-2021.02)

This job is in my third year. A professor in big data center hope we can sort out the important literature about systemic risk. The PhD student was revising the above paper at that time, so these

reports were done by me. I arranged the important papers in their area and made reports to the researchers. In this experience, I learnt how to make a literature review and gained more research experience.

The folder (*Department of Finance*) contains the arragement of literature.

3 Department of Mathematics (SYSU)

I had determined to pursue a PhD degree in my sophomore year and knew that mathematics skills are important, so I took many course in the school of mathematics. These courses include statistics (mathematics statistics, multivariable statistical analysis), probability (real analysis, stochastics process and advanced probability) and other fundamental courses. To be honest, some knowledge may have slipped out of my memory. However, this experience convinces me that I am capable of dealing well with the mathematics technique in finance. I also provide some handouts in this folder.

The next are some of my past research experiences in the department of mathematics.

3.1 Supplier selection and order allocation using two-stage hybrid model and game-based order price (2021.05-2021.07)

This research was done in my course Operations Research, and we are required to make a report on the paper in top journal. I coordinated with a classmate in the school of mathematics to complete this assignment. There are two parts that make this research challenging.

The first part is numerical experiment. The original paper constructs a supply chain model which is a multi-objective mixed-integer programming and solves it by Lingo. We tried to replicate the numerical result of paper and typed down the parameters and variables into other solvers Lindo, but our result was abnormal. Checking it for several times, we found that the author omitted an equation constraint in his paper. After adding the omitted constraint, we got the same result as the author presents in the paper. In addition, we designed an algorithm to solve the programming problem. Specifically, we divided the programming into three parts. Next, we dealt with integer programming by genetic algorithm, constraint by penalty function and optimization by gradient descent. Adjusting the proper parameters, we finally got a similar computational result as Lindo.

The second part is to understand the economic meanings. Although we could replicate the numerical result, the biggest challenge is to understand the meaning behind the formula and clearly explain the author's hybrid model. We searched the literature about data envelopment analysis and compared with other evaluation methods. The game theory in the model was also confusing at first, its objective function looked strange. However, we figured out how it came from after reading the paper by Harsanyi.

The folder (*Department of Mathematics*) contains this report and its coding.

3.2 Amazon E-commerce Product Analysis (2020.01-2020.02)

This mathematical contest in modeling held in the winter holiday in my second year. In this competition, many teams were stuck with the 30000 e-commerce reviews, which was a NLP problem and never happened in MCM before. Our team used lexicon-based method to obtain the sentiment

factor, adopted decision tree to dig out the information, and successfully predicted the potential products.

However, our team just got the Honorable winner prize (Top 26%), which was under our expectation. After the competition, I reflected our process of model building and make lots of introspection. I recognized that there are some faults in our prediction of time series and other problems, but it is a valuable experience for me. This experience strengthened my determination to learn mathematics and model building at that time, which helped me a lot in the later studies.

The paper about this contest can be found in the folder(*Department of Mathematics*) .

If you meet any problem, please contact me by zhangjt39@mail2.sysu.edu.cn. I am available at any time.