Statement of Purpose (PhD in ICME)

Though I was not certain of my specific career goals upon entering college, I decided to major in mathematics and physics in order to acquire core skills in math and modeling. After three years of exploration I discovered my passion in modeling, especially in a financial setting. The unique features of ICME' s interdisciplinary nature combining modeling, computation, and data science immediately attracted me. In order to further prepare for a research career in ICME, I am passionately pursuing at PhD, and the program at Stanford University is my top choice.

My past three years of achievements at Tsinghua University demonstrate my strong potential to be successful in graduate school and continue contributing to the research community. I have acquired a strong foundation in mathematics and physics and rigorous training in computer programming as I achieved first rank in C, C++, and MATLAB. I also gained a deep understanding of financial concepts through my 11 finance-related courses. My exceptional academic performance and GPA over the past three years helped me rank1st out of50 students within the university' s Academic Talent Program. In addition to a hard work ethic I also assertively seek opportunities to advance my education. I made an effort to explore related fields to ICME, and, while searching for effective tools to analyze financial market data, I became interested in the field of data science. In order to gain formal training, I

independently studied the Stanford courseCS229: machine learning and took related classes at Tsinghua such as statistical learning, artificial intelligence, and patter recognition. In addition, I participated in multiple contests to acquire modeling and computation skills. Among these contests, my biggest honor was being part of a group named the Outstanding Winner (top0.2%) of the Mathematical Contest in Modeling at Tsinghua in 2013.Our paper was later selected for the Society for Industrial Applied Mathematics (SIAM)special award, and our team gave a talk at the SIAM conference in San Diego in July, 2013.

During my undergraduate study, I developed a special interest in the application of financial modeling, and I participated in quantitative finance projects at Tsinghua. In the course Scientific Computation with MATLAB, I built a model to measure unreasoning and momentum for the Chinese stock market. Through this experience I further developed my programming and numerical skills by implementing the model on real market data. The superior performance of my model gave me the confidence to apply my strategy in the stock market, and it has performed very successfully in that setting. I also worked on a research project on Treasury bond future sunder the guidance of Professor Hao Wang. I learned about pricing mechanisms by implementing the Black-Derman-Toy model to price Treasury bond futures on market data.

The academic experience of working on quantitative finance projects at Tsinghua pushed me to seek similar opportunities in

industry to gain a more complete understanding of the field. I have interned at the hedge fund XHTH since the summer of 2013. Working with three PhD-holding cofounders in statistics and computer science, the environment allowed me to do deeper research than I had previously done developing trading strategies. I was very productive at XHTH as I challenged myself to think critically about each assignment. A major learning point happened when I discovered a market in efficiency in a project I was working on, but faced the problem of using nonlinear regression and implementing online machine learning techniques to big, e-commerce data. These challenges motivated me to explore related methodologies in machine learning. I broadly researched different strategies and compared the performances and complexities of many statistical methods. I paid particularly attention to ridge regression and showed its equivalence to Gaussian regression from Bayes view. I Also modified my ridge regression model with several efficiency improvements in order to meet the problem' s online learning needs. Later a paper on genetic programming inspired me to develop an automatic trading strategy generating mechanism. This encouraged me to combine my ideas on designing trading mechanisms with techniques in artificial intelligence. I continue to strengthen my skills in solving complex practical problems and feel very prepared and highly motivated to do PhD-level research.

I have realized my real passion is in using powerful mathematical ideas to describe the financial world. My model from the MATLAB course successfully captured the market' s momentum and

people' s unreasoning. The Black-Derman-Toy model described people' s reaction to changes in interest rates by analyzing abundant data from Treasury bonds and futures. The model I developed at XHTH was based on a huge number of stock prices and helped answer why the Chinese stock market is inefficient in certain situations. I am especially impressed with the amazing ability of genetic programming to methodically find patterns in financial market data. Without an understanding of big data or mathematical models, I could not have achieved these accomplishments.

In addition to my passionate work ethic and solid math background, features of my personality are well-suited for academia. Firstly, I never complacently accept a result without fully understanding its driving mechanisms. My advisor, Professor Hao Wang, once commented that I would be an excellent researcher because I "liked to ask why and figure things out." Secondly, I enjoy projects that require a lot of creativity and independent work. In these situations I feel comfortable developing my own strategy and tackling problems with minimal assistance. Moreover, my experience working on various group projects has developed my skills in clearly communicating an idea and collaborating with others, which are essential to success in any research environment.

After my SIAM presentation this past summer, I visited Stanford and was especially attracted to the diverse research and collaborative nature of the ICME program. I had the opportunity to speak with Professor Tze Leung Laiand was very impressed with the innovative

and exciting new program in ICME at the university. The PhD program in ICME would provide me with rigorous research training and equip me with a more theoretical understanding of subjects like data mining, computation, and optimization. I am very excited to apply to the PhD program in ICME at Stanford University and am supremely confident that it is the ideal setting for my graduate studies.