Personal History Statement

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1 My Personal Background

I was **born and raised** in Shuyang, a small and conservative town on the northern part of Jiangsu Province, China, bordering Shandong Province to the north. Northern part of Jiangsu Province is well-known for its poverty and great economic divergence from the Southern part of Jiangsu. In middle school and high school, I left my hometown to study on my own in Huai'an, a neighboring city. Ultimately, I was admitted to Renmin University of China.

I was born into an ordinary family in rural China. My grandparents were peasants, and my parents, through their own hard work and determination, managed to leave the countryside and settle in a small county town. There, they secured modest yet respectable jobs: my father became a grassroots civil servant, and my mother a middle school teacher. Despite their limited educational backgrounds—graduates of a teachers' college and a vocational school (somewhere between a high school and a college education)—they were diligent and deeply valued education. They taught me the virtues of hard work, responsibility, courage, selflessness, and a commitment to public service. I am forever grateful for their lessons and sacrifices. Also, my parents firmly believe that *education, exploring the frontiers of human knowledge, and applying one's research to practical outcomes are noble affairs*. This instilled in me a nascent motivation to pursue a PhD degree.

2 At Renmin: Exploration, Preparation, and Leadership

When admitted to Renmin University of China, I was keen on management practices and skills and chose Labor and Human Resources (LHR) as my major. During my first year at the School of LHR, I explored a wide range of social science courses, including legal studies, psychology, and management. Each subject fascinated me, making it difficult to settle on a clear academic focus.

I forgot the exact date I read *Toward a Comparative Institutional Analysis* by Masahiko Aoki. Masahiko Aoki uses mechnaism design language to develop a conceptual and analytical approach of comparative studies of institutions, and analyses many interesting questions as the evolutionary process of instituions, the rigidity and flexibility of institutions, and the complementarity within institutions. I never thought economics, or precisely game theory can provide amazing characterization and strategic-interaction foundations of human configurations, much beyond the market and trade. Also, it made me realize that abstract mathematical models could be applied in this way to practical problems. Discuss institutions, configurations, and organizations are NOT the patent for philosophy or sociology. THIS IS WHAT I WANT TO DO. This book, and *Institutions and the Path to the Modern Economy: Lessons from Medieval Trade* by Avner Greif confirm my belief to change my major from LHR to PPE (Philosophy, Politics, and Economics). My **high-level motivation** is to **incorporate economic theory with wisdom in Philosophy and Politics**, to explore more things, like Shengwu Li amd Ludvig Sinander.

I successfully transferred to PPE program, but it turned out to be far from what I had imagined. Due to limitations in the student-to-faculty ratio, the design of the PPE program at Renmin

University was rather rigid. It coarsely added all courses of three disciplines and does not provide many interdisciplinary courses. As a transfer student, I had to catch up on a significant number of foundational courses within a single semester, totaling around 40 credits. At the same time, the PPE program did not provide the developmental resources I had hoped for. Because the program was managed by the School of Philosophy, and the three departments had strained relationships, the program offered very limited guidance in economics. Under these circumstances, I felt disheartened, overwhelmed by my coursework, and physically unwell. Faced with these challenges, I decided to take a gap year to step back and explore my own path.

During the remaining six months of my gap year, I received funding from the Ministry of Education to conduct field research in 20 towns across Anhui Province, studying the **impact of public policies on rural homesteads and assessing farmers' perceptions of fairness and justice.** I am responsible for the theoretical framework of the design of poverty right policy for lands to balance fairness concern and efficiency. I found myself drawn to this work. During this time, I also delved deeper into game theory and its applications in organizational studies and political economy. This exploration helped me solidify a nascent academic direction: advancing the application of mechanism design in these two subfields. I also became increasingly interested in enriching the framework of mechanism design by exploring its connections to culture and institutional dynamics. This period was pivotal in shaping my academic aspirations. I want to be all in economic theory.

To achieve my goals, I sought advice from senior scholars and arrived at two key realizations: (a) rigorous mathematical training is essential, and (b) economics research in China lags behind the frontier, making it necessary to study abroad for future research. Therefore, **I complete all the courses in PPE within two years** to free up time for a research visit to a leading institution.[1] Beyond my curriculum, I pursued **mathematics courses** aligned with microeconomic theory and my research interests, including *Measure Theory, Topology, Functional Analysis, Machine Learning, Topics in Microeconomics*. Despite taking these courses with students majoring in mathematics or related disciplines, I consistently earned grades of A- or higher, even under the **intense workload of over 30 credits per semester**.

Except the class preparations, I also receive rigorous training in microeconomic theory. I am the primary participant at Theory Reading Group chaired by Zhonghong Kuang since Fall 2022. I also organize an organization economics reading group in Spring 2023 with my friends. Since Fall 2023, I am advised by Wei Zhao. We coauthor on joint design of information and mechanism, especially its applications in pricing digital goods. And I will elaborate these programs in the section 3. In a summer mini-course taught by Eyal Winter, Eyal encouraged me to practice my teaching skills. Therefore, I have assumed Teaching Assistant for Bin Miao, Zijia Wang, and Zhonghong Kuang.

In 2023-2024, I was the president of Ruichen Society. RuiChen Society is an academic research organization for economics and finance at Renmin University. Over the years, its members have pursued further studies at leading institutions such as Princeton, Stanford, Yale, Harvard, UChicago, with some having published in renowned journals like *REStud*, *TE*, and *JET*. During my tenure, I participated in a dialogue with President Lin Shangli and contributed to advancing reforms for academic societies at the university. During my term, I invited faculty members and excellent Ph.D. students to share research experiences, funded by the office of Academic Affairs. I coordinate RUC Economic Theory Reading Group. I also organized economics-related academic events, such as reading group on structural estimation methods.

[1] Due to a change of major, I completed the upper-division courses in my sophomore year and made up freshman courses in my junior year (my transcript and core course grades).

3 My First Program: Struggling and Personal Growth

Research is rarely linear, and my first project, *Selling Training Data*, has been a journey of persistent struggle, personal growth, and intellectual discovery. It has challenged me at every step—conceptually, technically, and even emotionally—but has also shaped my development as a researcher and my understanding of the effort required to produce meaningful work.

My first project tries to answer a foundation problem in digital economics, **what is the optimal screening mechanism for supplmental datasets?** The initial idea came from my advisor after listening to my presentation of Bergemann, Bonatti, and Smolin (2018), to whom I am deeply grateful for providing such a good question. It turns out to be a *joint design of multi-dimensional screening and information*. Wei is not a mechanism design researcher. We grew and learned together throughout this process, exploring numerous mechanism design papers and techniques. Additionally, Wei emphasized the importance of cultivating my own field—identifying a specific area where I could address *original and fundamental questions with meaningful economic value*.

Reading papers and finding workable framework with relevant economic applications as an extension was an essential first step. Understanding the mathematics was merely scratching the surface. The critical insights often lay hidden in the subtle algebraic transformations or motivations behind theorems drawn from optimization and probability theory. Only by reconstructing the model with my own hands, testing assumptions, and seeking to explain it to others could I begin to grasp its deeper essence. Also, **the economic significance and relevance** is the most important thing. Special thanks for this illumination are due to my discussion with Liang Dai and Yiqing Xing.

Through trial and error, I stumbled upon a promising framework, though it quickly proved much harder than anticipated. We frame the datasest as information structure. **The designer prices and designs information structure to screen agents with private information structure**. Multi-dimensional allocation nature of datasets was a major obstacle, and I had to rely on techniques from information design to reduce dimensions. The breakthrough came unexpectedly—I reduce the belief distribution to statistical error reduced form. It makes the problem tractable but also provided a framework to re-interprete Bergemann, Bonatti, and Smolin (2018).

While my coauthors and I eventually solved the benchmark case, understanding its intuition proved elusive. Also the further generalization is hard. Wei suggests me generalize our benchmark model in the framework of Che and Mierendorff (2019). It and other trials finally failed. I discussed it with Yangbo Song and Zheng Gong. Both of them provided some application cases and suggested me consider its applications to polish it towards a marketing-oriented paper.

Although it is a joint design of multi-dimensional screening and information, I still believe I can further generalize it. I kept exploring the limitations of the propositions I proved in the benchmark model. Finally I found the right way to generalize it: generalize the statistical error instead of belief distribution. It turns out to be a huge simplification and makes the problem tractable. Along the way, I made mistakes, misinterpreted proofs, and occasionally doubted the project's viability. Yet, each misstep offered an opportunity to learn—from refining my understanding of optimization theory to developing a deeper appreciation for the delicate balance between mathematical rigor and economic intuition.

Beyond technical hurdles, I also confronted with a failure in presentation. I recall my first major presentation at an internal seminar in Fudan RIDE, where I lost nearly all my listeners. Despite my enthusiasm, I failed to engage the audience, focusing too much on technical details and neglecting the importance of clear communication. It was during these moments of doubt that I began to truly grow. I learned to seek clarity in my explanations, to care about the audience's perspective, and to accept failure as an integral part of the process. I then try to practice my presenting and discussion skills by sharing my works with visitors, including Tilman Börgers, Frank Yang, Xiangliang Li, and

Rui Tang. I am greatly beneficial for their comments and encouragement.

I attend some conferences and present it at Berkeley, Stony Brook International Conference, CCER Summer Institute, GAMES, and Fudan. I have also discussed it with many researchers in different stages of this work and benefited from their comments. These experiences practice my skills in academic presentation and report, and teach me how to discuss my work explicitly to other researchers and receive useful comments. I am grateful to Fedor Sandormisky, Tan Gan, Yingkai Li, Elliot Lipnowski, Ellen Muir, Nima Haghpanah, Weijie Zhong, Anne-Katrin Roesler, Roberto Corrao, Doron Ravid, and Rakesh Vohra for their useful suggestions. I have learned to balance technical depth with clarity, to situate my work within the broader literature, and to emphasize the qualitative difference. Most importantly, I have come to appreciate the iterative nature of research—each phase of problem-solving, from setup to proof to interpretation, requires persistence, creativity, and a willingness to confront one's own limitations.

My current draft successfully generalize my results under some distributional assumptions. I want to further generalize this result. However, this task proved particularly challenging. The problem's multi-dimensional nature required creative solutions that eluded me for months. At one point, I attempted to apply techniques from optimal transport (Daskalakis, Deckelbaum, and Tzamos, 2017), robustness (Carroll, 2017), generalization of distributional assumptions (Haghpanah and Hartline, 2021). Despite my efforts, all these approaches failed to yield results.

I find myself torn between quickly submitting my current results to gain a revise-and-resubmit at a reputable journal, which might benefit my application, and continuing to push this problem as far as I possibly can. Ultimately, I've chosen the latter—to fully tackle the question to the best of my abilities and address it comprehensively, stopping only when I reach my limit. Fortunately, recent progress on additional proofs has given me hope of solving even more general cases.

4 Berkeley Life: Adapation, Balancing, and Training

Attending the Stony Brook Conference and coming to Berkeley marked my first experiences outside East Asia. Initially, I faced significant culture shock and was unfamiliar with the academic systems of North American universities. However, through my own efforts to adapt and advice from students senior to me, especially Zihao Li and Haotian Jiang, I gradually adjusted to the new environment. While my English was sufficient for academic discussions, I struggled with everyday communication. Interacting with local students, attending meals with PhD colleagues and speakers, and immersing myself in the Berkeley community helped me improve over time.

During my time at Berkeley, I worked to balance the demands of an intense academic schedule (two math PhD courses and an economics PhD course), cultural adjustment, and the pressures of PhD applications. I approached the math courses as opportunities for intellectual growth rather than focusing solely on grades, allowing me to prioritize my application. For the economics PhD course, I focused on mastering microeconomic theory, understanding proof techniques, and gaining deeper insights. This effort culminated in a perfect score on the midterm assessment. In the upcoming semester, I plan to take Advanced Microeconomic Theory II, as well as courses in game theory, mechanism design, and group representation theory, to further solidify my theoretical foundation.

At Berkeley, I present my work at Berkeley Theory Lunch, guided by Shachar Kariv. I also attend Theory Reading Group hosted by Quitzé Valenzuela-Stookey and present two papers in Fall 2024. I have been fortunate to receive very helpful feedback from many others at Berkeley and elsewhere. Special thanks are due to Chris Shannon, Sam Kapon, Anna Vakoraha, Sara Lynn Neff, Yu-ting Ho, Ruoyu Chen, and Haosen He.

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