Statement of Purpose

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1 Economic Theory as Vocation: Motivations & Preparations

My current **career goal** is to become an economic theorist and produce impactful research combining the elegance of theory with relevant practical applications.

Motivation. When I was admitted to Renmin University of China, I was deeply interested in management practices and chose Labor and Human Resources (LHR) as my major. I cannot recall the exact moment I first read *Toward a Comparative Institutional Analysis* by Masahiko Aoki, but its impact on me was profound. In this book, Aoki uses the language of mechanism design to develop a conceptual and analytical approach to comparative institutional studies. He explores captivating questions such as the evolutionary processes of institutions, their rigidity and flexibility, and the complementarities within them. I was astonished by how economics—particularly game theory—could rigorously characterize human configurations and strategic interactions, extending far beyond markets and trade. At that moment, I realized that this is what I want to do.

Aoki's work, alongside those by Avner Greif and Peyton Young, inspired me to switch my major from LHR to PPE (Philosophy, Politics, and Economics). My **high-level motivation** is to **integrate economic theory with insights from philosophy and politics to address broader and deeper questions**. The PPE major has cultivated excellent theorists, such as Shengwu Li amd Ludvig Sinander. I believe that the broader perspective of a PPE education, encompassing social sciences and the humanities, enables unique insights and contributes to economic theory.

Preparation: PPE + Math. 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, Mathematical Logic, 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**. During my 2024-2025 visit to UC Berkeley, I am further strengthening my foundation by enrolling in two Math PhD field courses (*Functional Analysis*, *Descriptive Set Theory*) and one Econ PhD course (*Economic Theory*). This training strengthens my mathematical foundation and equips me with advanced methodologies.

Preparation: Research & TA Training. I have received rigorous training in economic theory research both at Renmin University and UC Berkeley. Since Fall 2022, I have been an active participant in the Theory Reading Group chaired by Zhonghong Kuang. Additionally, I have served as a Teaching Assistant for Bin Miao, Zijia Wang, and Zhonghong Kuang.

[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).

Since Fall 2023, I am advised by Wei Zhao. We are coauthoring a project on the joint design of information and multi-dimensional screening, with applications in pricing datasets. At Berkeley, I presented my work at the Berkeley Theory Lunch under the guidance of Shachar Kariv and actively participated in a reading group hosted by Quitzé Valenzuela-Stookey, presenting two papers in Fall 2024. I have benefited greatly from insightful feedback from Shachar Kariv, Chris Shannon, and Quitzé Valenzuela-Stookey, all of which have refined my understanding to economic theory.

I have presented my work, *Selling Training Data*, at various conferences and seminars, including Berkeley, the Stony Brook International Conference, the CCER Summer Institute, GAMES, and Fudan. Throughout the development of this project, I have discussed it with numerous researchers and greatly benefited from their feedback. These experiences have enhanced my ability to communicate my work clearly and integrate constructive suggestions effectively. I am grateful to everyone who has helped me in my academic career.

2 My Current Work and Research Agenda

My current works contribute to information design and mechanism design, specifically in **utilizing information structures as screening instruments**. These involve the **joint design of multi-dimensional screening and information**.

Designing screening policies to mitigate information asymmetry is a cornerstone of economic theory. In many contexts, designers *design persuasion mechanisms*, i.e., use information structures to screen agents' private information. Examples include allocating and designing tests or investigations, pricing information products (such as data, consultancy, scores, and advertisements), and lobbying. Dating back to Admati and Pfleiderer [1986] and Admati and Pfleiderer [1990], the literature can be classified into three strands; persuasion mechanism without transfer (Kolotilin et al. [2017], Guo and Shmaya [2019], Ely et al. [2021], Dasgupta [2023]), persuasion mechanism with transfer (Li and Shi [2017], Bergemann et al. [2018], Yang [2022]), and mechanism design with persuasion (Bergemann and Pesendorfer [2007], Bergemann et al. [2022]).

My first work, *Selling Training Data*, characterizes revenue-maximizing policies for data brokers to **design and price supplemental datasets to buyers with private baseline datasets**. Buyers may obtain private datasets externally or collect them themselves. Private datasets influence the evaluation of supplemental datasets by altering outside options and how these datasets are merged in decision-making. This problem reduces to a *multi-dimensional screening problem* with *obedience constraints* and *double deviations*. These constraints simplify the menu by imposing rigidity. In this framework, we can re-interpret and extend Bergemann et al. [2018].

My second work, *Optimal Data Procurement with Tests*, addresses how to **design procurement mechanisms with inspection when data buyers possess baseline datasets to verify the purchased datasets**. The goal is to minimize transfers subject to eliciting truthful reporting by data collectors. Current results show that, without loss of optimality, this problem can be reduced to a screening mechanism subject to *a linear feasibility constraint between allocation and transfer*.

Broadly speaking, the mechanism design where **information structures as sources of information asymmetry (private type)** is a specific class of **multi-dimensional mechanism design problem.** Multi-dimensional screening is notoriously hard (Armstrong and Rochet [1999]). The optimal menu can be infinitely complex (Daskalakis et al. [2017]), while simple menus yield negligible profits (Manelli and Vincent [2007], Hart and Nisan [2019]). The literature imposes additional assumptions to justify optimality of certain bundling policies, such as robustness concerns (Carroll [2017], Deb and Roesler [2023]), distributional assumptions (Haghpanah and Hartline [2021], Yang [2023]), certain class of mechanisms (Hart and Reny [2015]), convergence rate (Frick

et al. [2024]). In future work, I aim to **generalize the methodological insights in my current works to explore a foundational framework in this field**.

Beyond the above, my research interests can be organized into two branches: (1) organization structure design, (2) culture and mechanism design. I also have broad interests in other areas of economic theory, including *model misspecification*, *dynamic learning and statistical inference in games*, and *testing the performance of economic models*.

1. Organization Structure Design.

1.1. Using Organization-specific Instruments as Incentive/Commitment Tools. Literature shows that internal incentive schemes (Winter [2004], Halac et al. [2021]), delegation systems (Alonso et al. [2008], Frankel [2014]), communication structure (Alonso and Matouschek [2008], Matouschek et al. [2024]) will shape organization performance. Beyond these, the organization designer can design *position*, *clauses/rules*, *welfare policies*, and *task allocation* as incentive and commitment tools. For example, the organization designer can allocate ex-post bargaining power to positions to ensure commitment and incentivize effort.

1.2. Robustly Optimal Organization Structure. An organization should handle tasks in different categories. For example, tasks in political organizations can be classified as environmental protection, administration reform and legislation, economic policy and regulation, and so on. Organization designer sets different sectors, i.e. the horizontal structure of organization, to divide these tasks. The designer also sets an award scheme to incentivize agents in different sectors to exert effort. Tasks may have correlations ambiguous to the designer. I am interested in what is the robustly optimal task allocation and reward design mechanism.

2. Culture and Mechanism Design.

2.1. Model Persuasion and Mechanism Design. Motivated by the conceptual framework analyzing interactions between culture and institutions (Acemoglu and Robinson [2024]), decision making under imperfect causal relations (Spiegler [2016]), model persuasion (Schwartzstein and Sunderam [2021]), and learning under different models (Mailath and Samuelson [2020]). I am interested in developing a theoretical framework to explore the *joint design of models/narratives and mechanisms* and *dynamics between models and institutions*. Institution designers use narratives/ideology/story to justify institutions, which in turn reinforce these narratives/ideology/story. I am dedicated to exploring the diversity of social configurations under this framework.

2.2. Culture-neutral/dependent Mechanism Design. The implementability and performance of a mechanism depend on culture and social norms. Agents' strategies in optimal mechanisms may exhibit morally and culturally dependent features. For example, the standard revelation principle in the static screening model implies that the mechanism designer can without loss of generality restrict the attention to truthful-telling mechanisms. In other words, the designer designs mechanisms inducing *agents behaving honestly*. These mechanisms perform well both in *economics* and *culture*. Given these observations, my broad vision is to conceptualize, formalize and characterize culture-related and culture-neutral mechanisms.

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