Research Statement
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I am a microeconomist with broad interests in game theory and mechanism design. In particular, my research fields include industrial organization, public economics, health economics and financial economics. Methodologically, I combine theoretical analysis with empirical investigations and laboratory experiments. The research topics are inspired by practical policy designs, new market structures, as well as empirical facts. The main driving motive of my works is to have a better understanding the underlying rule of the market organization and how to improve it.

My current research can be divided into three strands. The first strand discusses market design problems when monetary transfer is unfeasible. In particular, I investigate how priority rules affect agents' incentives in voluntary donation behavior and participation. The second strand studies dynamic mechanism design problems under limited commitment, in which some parties in the contracting game cannot be perfectly enforced. Besides the theoretical questions such as the equilibrium characterizations, I am more concerned with the policy implications of the study facing the problems. The third strand of my work focuses on search theory with network externalities, which is an important topic in industrial organization theory. Importantly, it has broad applications in emerging sectors, such as two-sided markets and fintech platforms.

A. Market design without monetary transfers

My first strand of research studies the market design problem in the absence of monetary transfers. In particular, I focus on designing priority mechanisms in order to ration resources with limited supply. The research is motivated by a series of policy design problems in medical resource distribution, such as allocating donated organs and distributing COVID vaccines. Our focus is how to improve the allocation mechanisms in order to induce more supply and participation. In the following three papers, it is framed as how to encourage agents to register as donors under different priority rules.

In the paper entitled “Organ donation with vouchers”, Jaehong Kim (Xiamen U), Mengling Li (Xiamen U) and I propose and analyze a family of dynamic mechanisms in which agents can obtain priority vouchers by registering by themselves or inheriting from parents. By employing an overlapping generation framework, we model the dynastic environment and study how the different policies affect the incentive for the patriarch (or matriarch) of a family to register. The key trade-off faced by the policy maker is that while inheritable feature of the voucher can incentivize the parent of a family to participate, it also create a free-riding effect that discourages the offspring, which makes the designing problem non-trivial. Our framework formally analyzes the consequences of different types of voucher mechanisms and illustrates how to minimize the negative effect and promote donation rate of the society. This paper is one of the first few works that applies the overlapping generation model in the market design literature and it has the potential to be extended to other problems that capture the interactions across generations.
paper was published in the *Journal of Economic Theory* in January, 2021, and it was featured in *Market Design* by Alvin E. Roth.

The above paper considers a vertically differentiated agents across generations. In the two following papers, we consider the horizontal heterogeneity among agents. Both works are co-authored with Mengling Li and Yohanes Eko Riyanto (Nanyang Technological University). Besides the theoretical analysis, we also test the model predictions by laboratory experiments.

In the paper entitled “Remedying adverse selection in donor-priority rule using freeze period: theory and experiment”, we consider the scenario in which agents are heterogeneous in health status, which is one’s private information. In the presence of adverse selection, while boosting the aggregate donation rate, the standard priority rule brings an unwanted impact by attracting more donations from agents with a higher risk of organ failure. This compromises the average quality of organ supply and decreases social welfare. We show that by augmenting the donor-priority rule with a freeze period, which delays the effective starting time of the priority benefit, it improves the aggregate donation rate without reducing social welfare. In other words, the freeze period policy uses time as a natural separating device to resolve the “lemon” problem. Our theoretical predictions are also confirmed in the laboratory. This paper has been accepted by *Journal of Economic Behavior and Organization*.

The third paper in the strand “Incentivizing organ donation under blood-type compatibility Constraints: Theory and Experiment” introduces matching compatibility into the framework, stylized in term of blood type differentiation. We compare the allocation policies depending on whether transplantation is performed only within the same blood-type group or not. Our result indicates that transferring organs across blood-type compatible groups discourages the donation incentives of hard-to-match agents and reduces the supply of the more widely acceptable type of organ. Meanwhile, the easy-to-match agents have higher incentives to donate. More importantly, the aggregated donation rate is lower if the cross-type transplantation is allowed.

**B. Dynamic mechanism design with limited commitment**

In the second line of research, I study the dynamic contracting problems under different types of limited commitment environments. I attempt to investigate how the market imperfection may alternate the optimal mechanisms compared with that under perfect commitment.

In the paper entitled “Non-linear pricing with reneging” joint with Yujing Xu (University of Hong Kong), we study a dynamic non-linear pricing problem, adding the possibility that the seller can costly renge on the initial contracts, which is common in reality in the forms of false advertising, add-on pricing and bait-and-switch. While reneging allows the seller to earn more surplus by offering a new full-extraction contract after learning the buyer’s preference, a forward looking buyer will hide information. We fully characterize the equilibrium direct mechanism with the presence of this strategic interaction and show that the quality distortion may be mitigated and consumer surplus can be enhanced when the market moves from full-commitment to one with modest reneging cost. In addition, we show that pooling mechanism can be also optimal since the seller can forgo learning opportunity in order to commit. We establish the precise condition under which the welfare improvement happens and further relate...
it to whether the market is niche or mass. Moreover, we show that in the sequential equilibrium, there always exists an implementable contract throughout the game even if the seller has already incurred the reneging cost and is free to modify it. By explicitly modeling seller's information extraction problem without full commitment, our results have policy implications on protecting consumers from deceptive business tactics.

The above paper imposes the commitment problem on the principal side. In another working paper “Ironing or rationing: optimal debt contract with limited enforcement”, I consider the scenario where the problem is on the agent side. The paper is motivated by the business model of the emerging online fintech platforms, in which agents usually borrow without tangible collateral. Hence, the financial institutions cannot prevent the borrowers from alternating the usage of the fund and running off. The market imperfection creates an endogenous outside option for borrowers for all types of agents. Therefore, besides the fact that low productivity agents' production are distorted from first-best situation, high type borrowers’ loan sizes also shrink by an ironing from the top. Further, I show that credit rationing might work as a remedy of the distortion, while the monotonicity of the mechanism may no longer hold.

C. Consumer search with network externalities

The third strand studies the search friction with network externalities, which is an important feature and has broad applications in the emerging two-sided markets. I have two finished papers and several on going projects on this line of research. The network externality may present in different forms.

The paper “Search frictions in many-to-one markets” studies the interaction between agents’ frictional search behavior and coordination incentives in a many-to-one matching environment, which captures the important features of markets such as crowdfunding and joint ventures. In my framework, each fundraiser requires contributions from multiple investors and hence market concentration is socially desirable. However, the investors move independently and hence lack effective coordination device. I show that the price dispersion caused by search friction can effectively act as an endogenous coordination device and hence improve matching efficiency. In contrast, without search friction, fundraisers conduct Bertrand competition, which eliminates such “signal”. Besides the theoretical analysis, I use a novel data with borrowers and lenders’ transaction details, provide empirical evidence and structurally evaluate the impact of search frictions in facilitating the investment concentration. This paper is currently under revision at the Journal of Industrial Economics.

I also study the market with search frictions from the angle of market design theory. In the paper “Priority Search”, Jaehong Kim, Mengling Li and I discuss the design of priority rule that differentiate the consumers into different tiers, attempting to resolve the congestion problem due to over participation. If we do not regulate the market, network externality is of the opposite direction compared with the previous paper since an appropriate diversification is socially optimal. We show that the priority fee raises the cost of entry and hence mitigates the congestion problem. More importantly, the socially optimal participation level can be achieved by a profit-maximizing monopolistic service provider, which makes the mechanism easy to imple-
ment. The priority search program is superior to alternative pricing mechanisms such as the mandatory matching fee scheme, because the former prevents the service provider from over charging, which may result in under-participation. The results of the work have important implications in regulating congested markets such as medical resource rationing, job hunting, ride hailing, and train tickets rationing during peak seasons.

Along this strand of research, I have another ongoing projects that combine the consumer search theory with experimental studies. In the working paper “Oligopoly competition with price stickness and search friction”, we consider a dynamic Bertrand competition among oligopoly firms that combines the price stickness and search frictions. While the buyers may be captive and not compare prices, the sellers may face some probability not able to adjust prices. Hence, the historical prices serve as the endogenous reference points that affect the sellers in setting new prices. We show the price changes are asymmetric. Namely, when the seller adjusts the price upwards, he will implement an $\varepsilon$-adjustment. However, there will be a jump under the downward adjustment. Our result provide an explanation of the price adjustment patterns for competitors on online platforms. In terms of welfare, the total surplus and price rigidity depict an inverse-U relationship.

Summary and future research

With the rapid growth of the information technology, the market structures will become diverse and some sectors maybe in need of designing a new marketplace to organize participants. Therefore, economists should be at the forefront of the market. My future research continues to focus on topics related mechanism design, with an emphasis on industrial organization, public economics and health economics.

As discussed above, some of my ongoing works start combine the method of market design and the IO problems in emerging sectors. For instance, I just initiate a project that studies the design of ride-hailing platform. We are concerned about negative externalities, such as traffic congestion that may be caused by the oversupply of drivers in certain areas. By analyzing a stylized model, we find that if the platform conduct asymmetric regulation policies on the drivers and passengers, namely the passengers can cancel orders at lower cost, then the equilibrium condition will induce mis-allocation of the market supply and imbalanced market depths. Our theoretical prediction is corroborated by empirical findings by based on a novel dataset regarding passengers and drivers behavior with detailed driving route information. Based on the findings of the marketplace, we plan do consider alternative market mechanisms that may mitigate the externality and improve welfare.

In a nutshell, I believe such a novel angle of analyzing market structures and policy regulations from the market design perspectives is not only interesting and promising but a mission for young microeconomics theorists to push forward and blaze the trail.