15-minute spiel for the interview

"Tell us about your job market paper."

In my job market paper, I study how a matching platform can strategically limit information exchange between buyers and sellers and improve the efficiency of the marketplace.

We know that when buyers and sellers are heterogeneous, providing information about the trading partners is key because it lets the market participants form the most **valuable** matches. However, more information also makes the participants pickier, and this decreases the **rate** at which the matches are formed. As a result, information availability slows down the matching that leads to lower surplus in the markets where speed matters. The high-level result of the paper is that when each side of the market has preferences over the other side and search is costly, the platform's strategic decision to withhold information the participants observe about each other can be welfare-improving.

Let me give you an example. In Uber marketplace, a driver receives requests from passengers and has an option to accept or reject each request. In the current version of UberX the drivers see the passenger's rating, name and location but do **not** see the passenger's destination until after the driver picks up the passenger. Well, the drivers **care** about where the passenger is going. Typically, the drivers don't like doing short trips or traveling to remote neighborhoods where it's hard to get another passenger. The quesion is: Is there a case for such information withholding to improve the **efficiency** of the marketplace?

In my paper, I study this question in a general framework that applies also to matching platforms for housing rental and labor contracting, such as Airbnb and TaskRabbit. In my model, buyers contact sellers and want to match quickly. Sellers recieve buyer requests and choose what buyers to accept and whom to reject. The sellers have limited capacity for serving buyers and most importantly, seller have preferences over buyers. The platform chooses a disclosure policy on the seller side of the market, namely it chooses how to reveal buyer characteristics to the sellers. I allow for arbitrary disclosure policies, that is, for an aribtrary mapping from buyer types to signals.

I have three main results. First, I show that full disclosure of buyer characteristics is Pareto-inefficient. In the second and the third, I characterize the optimal disclosure policy in different environments.

For example, Back to the Uber example, a disclosure policy governs what passenger characteristics are revealed to the driver and how coarsely. Full disclosure is the one when Uber shows the exact passenger destination. A coarse disclosure would be, for example, to partition all destination into three categories, close ride, medium-range ride, far ride, and show to the driver only the category the destination belongs to.

My first main result is that under the full disclosure, a combination of buyer and seller surpluses is Pareto-inefficient. Let me tell you why, first, for the buyers, then, for the

sellers. Revealing buyer information to sellers stimulates sellers to cream-skim. Specifically, sellers will single out the matches valuable to them but reject other matches that are valuable to the buyers. Therefore, disclosing to sellers may hurt buyer surplus.

Disclosing less information makes sellers less picky, they settle for less and tend to accept more matches.

[A key observation is that the platform can increase a seller's expected marginal profit by limiting the information revealed to him. To do so, it should pool the attractive jobs with marginally unattractive jobs putting more weight on attractive jobs. Marginally unattractive are the jobs that are marginally profitable and are rejected because a seller prefers to wait for a better job. Attractive jobs are the profitable jobs that are accepted.]

Now, what is more interesting is that information availability also makes sellers worse off as a whole. Intuitively, each seller keeps his schedule open by rejecting the low-value matches in order to increase his individual chances of getting the high-value matches. As a result, the sellers spend a lot of time waiting for the most valuable buyers. Collectively, this behavior is suboptimal because all seller-valuable matches have to be accepted in order to maximize the joint seller surplus. The platform's policy of withholding the buyer information reduces sellers' cream-skimming behavior, and improves the efficiency of the marketplace. To summarize the reason behind the first result in one sentence, full disclosure is inefficient because it stimulates search, and search generates same-side and cross-side externalities.

Now let me move on to the next part of the paper where I study the optimal disclosure policy. The optimal disclosure policy depends on the details of the seller side of the market, and I study this question in two environments. The first environment is where the platform knows the sellers' preferences; and the second environment is where the seller preferences are unknown to the platform.

Let me start with the case of known seller preferences. I show that there is a very coarse disclosure policy that implements an economic outcome with both higher buyer and seller surpluses. For any given buyer, this disclosure policy sends to the seller one of two signals: either a recommendation to accept or a recommendation to reject. In fact, with the right choice of signals, the implemented outcome is Pareto-efficient in the sense that is no other seller strategy profile that generates higher buyer and seller surplus. How to choose the signals? Take a Pareto-efficient outcome that dominates the full disclosure outcome. By the Revelation Principle, it is sufficient to recommend seller to accept the matches that lead to this Pareto-efficient outcome, and recommned to reject the others. The sellers follow the recommendations because the platform knows seller preferences.

Now let me tell you about my main technical contribution, which is the case of unobservable seller preferences. In the whole generality, the matching payoffs have a complex structure

because there are 4 sources of heterogeneity in matching payoffs: both buyer and seller characteristics potenially affect both buyer and seller payoffs. Therefore I restrict my attention to the setting where seller payoff is a linear function of seller and buyer type, and buyers have no preference over sellers. High seller types—call them professionals—can profitably complete a larger set of buyer tasks than low seller types—call them amateurs. The platform does not know if a given seller is a professional or an amateur, and this creates an additional tradeoff into the platform's disclosure problem. Specifically, if the platform was to withhold information in a way I described earlier to stimulate the **professionals** accept more buyers, the **amateurs** would stop working at all. To see why, note that the pool of buyers supposed to be accepted by professionals contains a lot of buyers who has negative value for the amateurs. Therefore, the amateurs would reject the professional's recommendation to accept. This logic suggests that the platform should release more information so that sellers have information needed to stay profitable on the platform.

And indeed, welare-maximizing disclosure policy in this case is more revealing than when seller preferences are known. In partiular, I show that the optimal disclosure policy has the form of upper-coarsening, in which high buyer types are pooled, and low buyer types are perfectly revealed. And this is my third main result.

Now let me tell you how I solve this disclosure problem. Building on the information communication literature (Kamenica-Gentzkow 2011), the platform's problem is a disclosure problem of buyer type to an unobservably heterogeneous audience of sellers, who are also forward-looking.

I approach this problem by representing signaling structures as a particular class of convex functions and then using the calculus of variations to find the first-order necessary conditions. The best way to see that the optimal disclosure policy is qualitatively different when sellers are forward-looking, consider the uniform distribution of seller types and the platform's objective to maximize the average acceptance rate. In this case, when the sellers are unconstrained, the disclosure policy does not affect the matching rate. However, when sellers are constrained, the strict optimal disclosure policy is upper-coarsening.

In this case, the design of the optimal information disclosure is a nontrivial problem. To see why, note that with forward-looking sellers, the information disclosure policy determines not only the seller's stage payoff but also the distribution of his potential future payoffs. As a result, a seller's decision to accept depends not only on the posterior mean of the buyer type–which is standard in this literature—but also on the entire signaling structure. This makes a typical approaches in the literature, such as concavification as in the recent bayesian persuasion literature, is unsuitable for the analysis of my model.