Research Statement

My broad research area is microeconomic theory but I focus on the theory of mechanism design. Two of my papers concentrate on the design of stopping problems. In such problems, a principal designs a dynamic game whose rules can influence the agents to choose the stopping time the principal prefers. My models have several important applications: (i) the design of employment insurance contracts that motivate workers to search for jobs and the acceptance of job offers; (ii) the design of voting rules for search committees that affect the speed of hiring; and (iii) the design of research funding that affects the care with which academics select projects. My third paper focuses on the design of matching algorithms. In my application, a principal designs an algorithm that matches students to schools. These problems are extremely interesting and important to me because the solutions not only attempt to explain people's existing behavior, but they also offer methods with which the government or the firms can use to improve the welfare of all participants.

Current Work

I now discuss the two completed papers on stopping problems as well as my work on school choice. Though each of the first two papers below investigates the design of stopping rules, the papers differ in three respects: the availability of transfers, the number of agents, and the number of actions. In my job market paper, no monetary transfers are allowed and there are multiple agents. In the absence of transfers, the mechanism designer cannot just modify the payments as a function of an agent's behavior in each period so as to keep incentives right. It is therefore important to link decisions over time. The rules must vary with the agents' history in order to alter the agents' behavior. In addition, since there are multiple agents, the decision rule in the current period depends not only on the past behavior of one agent but also on the past decisions of other agents. Each of these features (no transfers and multiple agents) are reasonable but make the mechanism design problem more complicated. My second paper on stopping rules is distinguished by the number of actions available to the agent. In the presence of just one action, an agent needs only to choose a stopping time. In the presence of multiple actions, an agent needs to choose a stopping time and select an action, so the designer cannot implement a stopping rule using a sequence of single thresholds. Instead, implementability in this environment require a sequence of threshold pairs. Again, this feature (multiple actions) complicates the mechanism design problem but is realistic in many economic situations. Implementability in either of these two important environments (no transfers and multiple agents; multiple actions) has not been studied previously in the literature.

In my job market paper, titled "Design of Committee Search," I study a stopping problem in the absence of transfers in the presence of multiple agents. In my leading example, a search committee receives job applications sequentially and chooses whether to stop and hire the current candidate. (Other examples include a couple's search for a house or coauthors' search for a research project.) Each member of the committee has her own preferences regarding hiring the current candidate. The committee must adopt rules for how its decision is reached. I consider a large class of rules that contains random dictatorship, various types of voting rules, or any rules that determine the outcome as a function of the members' preferences. In a subclass of simple voting rules, each member chooses from a subset of three votes: veto, approve, or recommend. The candidate is hired whenever no member vetoes and at least one member recommends. I show that every implementable rule is equivalent, in terms of payoff to the members, to randomizing among these simple voting rules. As a result, the optimal voting rule can be constructed from these simple rules. The contribution of this paper is that my results simplify the design of committee search significantly, because the designer can restrict attention to using only these simple rules.

In my paper titled, "Mechanism Design for Stopping Problems with Two Actions," I analyze a

stopping problem in the presence of multiple actions. In my leading example, a government chooses employment insurance payments in each period in order to influence a worker's decision to accept a job offer or exit the labor market. I provide conditions under which each payment schedule is associated with a sequence of upper thresholds (above which the worker accepts the offer) and lower thresholds (below which the worker exits the labor market). I also provide a closed-form formula for the payment schedule as a function of the sequence of upper and lower threshold pairs. By varying the thresholds and the associated payments, the government can influence the speed at which workers accept jobs. This solution can be applied to similar problems in which a principal designs transfer schemes to influence an agent to use a particular stopping rule and to choose one of two alternatives upon stopping. Examples include the design of a sequential Bayesian hypothesis test or the allocation of extra resource into one of two projects.

I have another research project in progress, titled "School Choice with Observable Characteristics," in which I study the design of a mechanism that assigns students to schools. Generally, all else equal, students prefer going to nearby schools. Popular mechanisms in the existing literature, such as deferred acceptance algorithm and random serial dictatorship, do not take into consideration the students' observable characteristics such as the location of a student's home. The school allocations resulting from these popular mechanisms are functions only of the students' preferences. Though students may want to attend schools outside their neighborhood, transportation costs and relocation cost increase in this case. Therefore, I develop a mechanism that assigns students to schools based on the students' observable characteristics. I restrict attention to mechanisms that allocate students in a way such that (i) no student prefers the allocation of another student, (ii) there is no other allocation that is preferred by every student, and (iii) treatment depends only on a student's observable characteristics. I show that the welfare-maximizing mechanism satisfying these requirements is a modified probabilistic serial mechanism with capacities. These capacities specify the maximum number of students with given characteristics that can be admitted into each school. I am still working on the comparison of my solution to other existing mechanisms in the literature.

Future Directions

In the near future, I plan to continue my work on dynamic mechanism design problems. In addition to the applications discussed above, the solutions to the mechanism design problems that I study have applications to policymaking in industrial organization and labor economics. I have experience with econometric methods, especially machine learning techniques such as decision trees, neural networks, and support vector machines, so I plan to participate in research with an empirical component and I hope to collaborate with faculty members in other fields of applied microeconomics.

I would also like to incorporate ideas from behavioral economics to examine design problems with bounded rationality. Perfect rationality is a particularly demanding assumption for dynamic problems. It is difficult for agents to remember past choices perfectly, compute probabilities for future events accurately, and determine expected discounted values correctly. In the employment insurance example, given the sequence of payments, the worker may not be able to calculate the correct thresholds in each period and, as a result, might either accept an offer too late or exit the labor market too early. Similarly, in the committee search example, the voters might find it hard to identify the veto thresholds because the rules change over time, and, as a result, voters might submit an incorrect vote. In my future research, I plan to consider stronger equilibrium conditions or reduced commitment power such that the mechanisms are more robust to agents with limited memories or agents who use myopic decision rules. I also plan to read more of the behavioral economics literature in order to find other models of bounded rationality. Under weaker assumptions of rationality, the results from the field of dynamic mechanism design could be more applicable to real-life policies.