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RESEARCH STATEMENT

September 2011

My general research fields are applied microeconomic theory and public economics. That is, I study the decisions of individuals and their effects on social and economic outcomes, often in situations where individual incentives and social goals are misaligned. My core research interests in these fields can be grouped into three topical areas: Political economics, the economics of prejudice and discrimination, and the economics of open access. These lie at the intersection of economics with political science, sociology, and law, respectively. In Section 1 below, I will describe my contributions, as well as ongoing projects, in each of my core research areas.

Methodologically, my research employs game-theoretic approaches to human and firm behavior. In several of my papers, I use contest models to study competition over fixed prizes. Most of my work is theoretical; when empirical applications are examined, these are carefully grounded in theoretical analysis.

In addition to my core research areas, I have investigated a number of other questions in game theory and behavioral economics. A brief summary of this work will be given in Section 2.

1. CORE RESEARCH AREAS

1.1 Political economics

Political economics is the study of how political institutions affect economic outcomes, and how economic reasoning can explain political behavior and institutions. My work in this area focuses on a number of strategic aspects arising in electoral systems, on both the candidates' and the voters' sides. Much of this concerns the spending of money by politicians to further their chances of election. How are spending decisions made, and how do spending decisions affect electoral outcomes? I address these questions in a series of papers.

Together with my coauthor Mattias Polborn, I have theoretically examined campaign spending in the U.S. presidential primary system. In our paper ***"Primaries and the New Hampshire Effect"*** ([10]), we develop a contest model of sequential primaries, in which candidates can influence their winning probability by spending money on campaigning. The equilibrium of this model replicates several stylized facts observed in real primary races: Campaigning is very intense in early districts, and declines (on average) in later districts. Thus, our model is able to endogenously generate "momentum" in the primary race. In contrast to previous research on sequential elections, this momentum is not due to learning effects on part of either voters or politicians, but is instead driven by an asymmetry in campaign incentives after the first election. Our study also compares sequential primaries with a simultaneous "one-day primary," and offers a possible economic explanation for the sequential organization of the U.S. presidential primary system: It leads, in expectation, to less expenditures than a simultaneous election, and selects more effective campaigners with a higher probability.

While [10] considers a resource allocation problem across elections in a multistage primary contest, there also exists a tradeoff between allocating campaign resources to primary contests and the general election. This tradeoff is examined in the paper ***"Early Round Upsets and Championship Blowouts"*** ([3]). Even though the paper is motivated by a sports application, the theoretical model developed in [3] applies equally to the allocation of resources by candidates across primary and general election campaigns. My coauthor Rick Harbaugh and I show that weaker candidates strategically spend more in the primaries, while stronger ones conserve resources for the general election. These strategic distortions increase the likelihood of weak candidates being nominated. Estimation of an empirical model (using a sports dataset which allows for clean identification of the strategic effects) confirms our theoretical predictions in actual behavior, although in a different context.

The role of money in elections also motivates my research on campaign finance mechanisms, where I examine how the sources of campaign funds affect electoral outcomes. In the paper ***"Populism, Partisanship, and the Funding of Political Campaigns"*** ([9]), I address this question in a framework with privately informed candidates. I define populism as a politician's effort to appeal to a large group of voters with limited information regarding a policy-relevant state of nature. I examine a setup in which the populist motive makes it impossible for candidates to credibly communicate their information to voters. I show that the presence of wealthy special interest groups (SIGs) with partisan preferences can mitigate this effect and thereby improve policy. This does not happen because SIGs are better informed than policy makers. Instead, the campaign contributions by SIGs allow politicians to insulate themselves from the need to adopt populist platforms. I also show that a regime in which SIGs are allowed to contribute to politicians' campaigns can Pareto-dominate regimes in which such contributions are restricted, or in which political campaigns are publicly financed.

I am currently extending my research on campaign finance in a study coauthored with Hugo Mialon and Michael Williams, where we examine the effects of matching funds in publicly funded campaigns. Matching provisions in Arizona's election law have recently been ruled unconstitutional by the U.S. Supreme Court on first amendment grounds. By modeling political speech as a costly activity in an electoral contest, we show that matching funds indeed have a chilling effect on speech by privately funded candidates. However, we also show that the state can undo any restrictions on matching programs imposed by courts, and precisely replicate the equilibria under the matching program, by adopting an appropriate chosen lump-sum funding scheme. The effect of the Supreme Court's ruling could thus be negated if states react by adopting a lump-sum public funding system.

A different angle is taken in the paper ***"Strategic Voting and Conservatism in Legislative Elections"*** ([7]). Here, I investigate strategic issues arising among voters, instead of politicians. In particular, I examine the question under what conditions elected legislative bodies will be status-quo biased relative to a majority of constituents. I develop a model in which voters elect representatives into a legislative assembly, who then make a policy choice. A strategic delegation effect arises: Constituents may want to be represented by legislators who prefer less change of the status quo than they do, as this helps to insure against policies that contain too much change. If this motive is strong enough, equilibrium legislatures will be conservative, in the sense of being reluctant to change (relative to a majority of citizens). I show that this happens when constituencies are sufficiently heterogeneous in their policy preferences. I establish bounds on inter-district heterogeneity beyond which conservatism can, and must, arise in equilibrium. The paper hence provides a new theory of legislative reform obstacles. Some insights are also developed concerning the representation of minorities, and the coordinating role of political parties in legislative elections.

1.2 Economics of discrimination and prejudice

Differences in treatment of individuals based on their gender, race, or ethnicity—and the resulting inequalities in outcomes—have been the subject of economic inquiry for a long time. An important goal is to explain the fact that, in many areas, discrimination is seemingly persistent even in otherwise free and modern societies. Developments in information economics in the last 40 years have made it possible to account for persistent discrimination as equilibrium outcomes, by building informational frictions into economic models of the labor market—instead of having to rely on taste-based (purely treator-side) or biological (purely treatee-side) explanations. My research in this area falls in this tradition and extends information-based approaches to discrimination and prejudice in several directions.

Together with Phil Curry, I extend the labor-market model of statistical discrimiantion to the criminal justice system. In ***"Crime, Punishment, and Prejudice"*** ([1]) we examine the link between the penalties used to punish convicted criminals, and judicial prejudice against defendants in court. We develop a model in which individuals choose to commit crimes if their privately observed utility from doing so is high enough. A crime generates noisy evidence, and defendants are convicted when the evidence is sufficiently strong to establish their probability of guilt beyond a fixed threshold of doubt. If convicted offenders are punished by incarceration, the induced utility loss is smaller for poorer individuals than for richer ones. Poorer individuals are hence less deterred by the threat of punishment. In equilibrium, poor individuals face a strong prior prejudice in trials and are convicted with less evidence than others. At the same time, they commit crimes more frequently—not because they have more to gain from crime, but because they have less to lose if caught. If income is correlated with race, this mechanism provides a novel explanation of the fact that criminal participation and conviction rates are correlated with race. However, biased outcomes can persist even if no race-income correlation exists ex ante. This happens if an unfavorable prejudice in the justice system lowers employment opportunities or wages for certain groups. A self-fulfilling statistical discrimination equilibrium can then arise, in which race serves as a coordination device through which social roles and expectations are assigned. We develop an income-dependent penalty schedule ("day fines") that guarantees unbiased outcomes, providing insigths into penal code reform for certain offenses.

A different statistical discrimination mechanism is the focus of the paper ***"Second-Order Statistical Discrimination"*** ([13]). My coauthor Xuejuan Su and I extend the statistical discrimination model to higher-order moments of individual characteristics. The conventional statistical discrimination model explains why the belief that one population is less qualified than another, *on average*, can be self-fullfilling. We examine whether a similar self-fulfilling prophecy can arise with respect to the *variance* of two distributions. We are specifically interested in the under-representation of female employees in some elite jobs (e.g., CEOs), which is sometimes attributed to a "tail effect": If the human capital distribution exhibits less variation among females than among males, then even with comparable average human capital there will be fewer females in the right tail of the distribution than males. We show that the belief that the female human capital distribution has a lower variance than the male distribution can be self-fulfilling, in that it provides individuals with incentives to acquire human capital such that the resulting distribution exhibits exactly this property ex post. If this happens, fewer females than males are employed in high-end jobs—a "glass ceiling" effect. Similarly, fewer females are employed in low-end jobs, and fewer males are employed in mid-level jobs. The average productivity of female workers can at the same time be higher, lower, or equal to that of male workers.

In the paper ***"A Theory of Perceived Discrimination"*** ([14]), Xuejuan Su and I investigate the source of persistent differences in beliefs about discrimination, instead of the persistence of discrimination itself. For example, in opinion polls African-Americans have been persistently more likely than white Americans to agree with the statement that blacks are discriminated against in matters of employment. We develop a contest model in which such differences in perception of discrimination can arise endogenously. In our model, a continuum of individuals compete for a fixed number of prizes (e.g., desirable jobs), and individuals belong to two identifiable groups. We prove a number of observational equivalence results. In essence, these results show that an individual's belief that one group is allocated a lower quota of prizes than the other group will be consistent with observed data in equilibrium, regardless of whether such quotas actually exist in the contest or not. The paper also provides some insights concerning the use of employment data by government agencies or courts to idenitify discrimination in the labor market. We are currently applying a similar contest model to examine the effects of small differences in initial conditions across populations on economic inequalities.

1.3 Economics of open access

A third core research interest concerns investment incentives under open access. This research addresses the question of how to regulate a natural monopoly whose market power derives from essential and costly network infrastructure. For example, transmission infrastructure is necessary for power plants to deliver electricity to buyers, and presents a substantial barrier to entry in the electricity generation market. Network owners can therefore extend their infrastructure monopoly to potentially competitive market segments, a practice called "vertical foreclosure." States traditionally regulated the monopoly's operations in the foreclosed segments. Following a shift in the regulatory paradigm during the 1980s and 1990s, however, policy makers in the United States and elsewhere have adopted a liberalization program aimed at opening networks in vertically integrated industries. Open network access forces network operators to lease their facilities to competitors at regulated rates, leaving service offerings and prices to be determined by competition in the end-user market.

The implementation of open access has generally been successful in facilitating competition in previously closed markets, with positive effects on allocative efficiency. A concern, however, is that requiring firms to share costly infrastructure with competitors takes away their economic incentive to invest in it—thus diminishing the long-run, dynamic efficiency of the market. In a series of papers, my coauthor Xuejuan Su and I examine the validity of this concern. This requires that one carefully considers how network operators are compensated for their obligation to grant network access to competitors. In this respect, existing economic theories of investment incentives under open access are surprisingly divorced from how actual access pricing mechanisms work, and what the pertaining laws require. On the other hand, legal studies of the subject matter either ignore economic incentives, or base their conclusions on a flawed understanding of incentives. Finally, little is known empirically about how access regulation affects investment, even after more than a decade of liberalization. The aim of our work in this area is to address all three problems.

In the paper ***"Open Access and Dynamic Efficiency"*** ([12]), we examine theoretically whether laws such as the 1996 U.S. Telecom Act or the 1992 U.S. Energy Policy Act, which require open access to network infrastructure, weaken investment incentives. (Our work applies also to laws such as the 1954 U.S. Atomic Energy Act or the 1970 U.S. Clean Air Act, which provide for open access to patents and may thus weaken innovation incentives. However, an opposite paradigm shift in intellectual property protection renders these provisions essentially irrelevant today.) We consider a regulatory mechanism which requires network owners to grant competitors access to their facilities at a linear tariff. This tariff is set according to the principles of fair, reasonable, and non-discriminatory pricing, which are required by virtually all current open access laws and require only limited information on part of the regulator. Furthermore, the tariff severely restricts the network owner's ability to exploit its privileged position for supra-competitive profits. We show that, under certain assumptions on preferences and technology, the owner's investment exceeds the monopoly investment level, and increases in the number of competitors. Our results hence contradict the notion that dynamic efficiency must be sacrificed for gains in static (allocative) efficiency when an open access regime is implemented.

In a second paper, ***"Strategic Investments under Open Access: Theory and Empirical Evidence"*** ([15]), we generalize the framework of [12] and test its predictions empirically. We allow for a range of possible access tariffs, as long as they adhere to two legal principles routinely applied by regulators: The filed rate doctrine, which prevents network operators from adjusting rates retroactively; and again the fair, reasonable, and non-discriminatory pricing principle. We demonstrate that investment incentives can be decomposed into a non-strategic incentive and a strategic incentive. Under mild assumptions on demand, the first effect implies larger investments in more competitive markets, regardless of their composition. The second effect takes into account competitive responses to investments, and may strengthen or weaken the non-strategic incentive.

The assumptions made in [12] guarantee that the strategic effect never overwhelms the non-strategic incentive. Under more general conditions, however, this is possible. We estimate the presence and direction of strategic investment incentives using a dataset of electric utilities regulated under the 1992 U.S. Energy Policy Act. We find evidence that investments in transmission capacity are indeed made strategically. Ceteris paribus, utilities are less likely to invest, and investment levels are lower, when competitors occupy a larger share of the market. The strategic effect is of comparable magnitude to the non-strategic effect. Our results suggest that, in the U.S. electricity wholesale market, gains in allocative efficiency come at the expense of some losses in dynamic efficiency.

2. OTHER RESEARCH

I have also done research on more abstract games, as well as behavioral models of human decision making, and looked at applications that do not fall squarely within the core fields outlined above. The present section provides a summary of this work.

In game theory, I have examined the properties of solutions to both non-cooperative and cooperative games. Understanding the mathematical regularities of game-theoretic solutions can provide us with alternative characterizations of equilibria, which (among other things) can be useful in computational applications. In ***"Perfect Equilibrium and Lexicographic Beliefs"*** ([2]), my coauthor Hari Govindan and I investigate the epistemic foundations of equilibrium refinements based on Selten's perfection criterion. We obtain a finite characterization of perfect and proper equilibria in terms of lexicographic probability systems (LPSs). We depart from previous work in the area by considering LPSs defined directly over individual strategy sets. Our contribution is to define a multiplication operation by which these LPSs can be composed into a product LPS over the joint action space of the players. Checking whether a Nash equilibrium is perfect then boils down to checking whether each player's strategy is a lexicographic best reply against the product LPS. In ***"Two-Sided Matching with Spatially Differentiated Agents"*** ([6]), I consider the problem of assigning individuals to stable matches in a spatial environment where the match surplus function is decreasing in distance. Under non-transferable utility, I show that all stable assignments partition the population into spatially segragated communities within which matching occurs. I then provide conditions under which this property carries over to transferable utility. This allows for a graph-theoretic representation of assignments, in terms of a forest, which can be utilized in a simple algorithm to compute surplus shares. In the paper ***"Matching Markets and Social Networks"*** ([11]), my coauthor Mary Schroeder and I apply this model to a labor market application with specialized workers and firms.

Most of my research employs the standard economic assumptions of self-interested preferences and perfect rationality. Behavioral economics, on the other hand, includes various forms of non-standard assumptions on preferences and rationality in economic models to provide a richer account of human behavior. I believe that much can be learned from behavioral models especially in two cases: If small deviations from the standard assumptions have strong effects on outcomes, and in the opposite case where large deviations in assumptions have only small consequences. The first case identifies instances where the predictions of the standard model are sensitive to behavioral assumptions; the second identifies instances where one can regard the standard model as a robust approximation of actual human behavior. I have explored each of these angles. In the paper ***"Finitely Repeated Voluntary Provision of a Public Good"*** ([8]), I examine the voluntary provision of public goods when agents are either slightly altruistic or slightly irrational. A small degree of such behavioral distortions can generate large contributions to the public good in a finitely repeated game, even if the free-riding incentive calls for negligible contributions in a static setup. The equilibrium is characterized by a decline in contributions toward the end of the game, and is consistent with a number of comparative results obtained in laboratory studies. In the paper ***"Linear Learning in Changing Environments"*** ([4]), I examine the performance of simple linear learning rules, relative to the optimal non-linear Bayesian rule, in a setting where a decision maker observes signals about a time-varying state. For a range of parameter values, linear learning generates the same decisions as Bayesian learning and is therefore equivalent. Outside this parameter range, the consumption attainable with linear rules is virtually indistinguishable from that attainable under Bayes' rule, although the respective decisions will not always be identical. A linear "rule of thumb" can therefore have an advantage over Bayesian updating when more complex, non-linear, calculations are costly to perform.

Finally, in the paper ***"Communication in Financial Markets with Several Informed Traders"*** ([5]), I investigate the incentives of informed traders in financial markets to reveal their information truthfully to the public. In my model, some traders receive noisy signals about the value of an asset and can make public announcements between trading periods. An equilibrium exists in which traders make credible "buy" or "sell" recommendations, if and only if the number of informed traders is large enough. I show that the post-communication asset price converges in probability to the full-information estimate as the number of informed traders increases.

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