**Research Statement**

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**Overview**

My research interests center on the use of microeconomic theory to obtain empirical predictions and econometric tools for the analysis of various models of preference and decision making. I am particularly interested in predictions or tests that are robust under misspecification, limitations on available data, or perturbations of the underlying model assumptions.

**Empirical Theory of Models of Preference and Decision Making**

My job market paper 'Preference Regression' develops the foundations of an econometric theory for models of preference. I consider a novel form cardinal data, quantifying the intensity of an individual's preference across pairs of alternatives, and provide a dominant-strategy incentive compatible mechanism for eliciting it in laboratory settings. For a wide range of models, I show that data of this form may be interpreted as explicit observations of a subject's *utility differences*, under a canonical choice of representation, which I axiomatize. Examples include a large variety of well-known preferences over classical commodity spaces, finite or infinite horizon consumption streams, and spaces of risky or uncertain prospects.

Based on these theoretical underpinnings, I develop a tractable least-squares theory for data sets of this form. Here, minimization of mean squared error takes place over an appropriate space of utility functions, rather than over the consumption space, avoiding a number of pitfalls associated with the estimation of parametric preferences. This provides a uniform framework for studying a wide range of empirical questions that are either difficult or impossible with our present tools for analyzing traditional (ordinal) revealed preference data. For example, I show that not only can this least squares theory quantify the predictive accuracy of various models in a systematic fashion, but that it provides granular insights into which individual axioms or assumptions drive the model's predictive success or failure. When models are parametric I show that it is straightforward to obtain point estimates for best-fit parameterizations, even for inconsistent data; when models are non-parametric, one instead obtains bounds on the underlying model primitives. I provide applications of these identification arguments to trade and welfare. Finally, when data is stochastic I provide a general collection of explicit, non-parametric hypothesis tests of rationalizability by individual models.

In the future I plan to build on the foundation laid by my job market paper in several directions. Firstly, I plan to extend my existing analysis of misspecified experiments. In my job market paper, the interpretation of observations as corresponding to utility differences is generally only valid for a correctly specified model; moreover the specifics of the mechanism used to elicit the data will generally depend upon the underlying model considered. However I show, for a range of additively-separable preferences, that not only can such misspecification be tested for, but in fact the data that would have been obtained under a correctly specified experiment can be non-parametrically estimated from data obtained in a misspecified experiment. I plan to further explore this phenomenon, as a means of not only

obtaining more robust results, but also of removing the need for reduplication to study different classes of models.

Secondly, I plan to explore the asymptotic theory of the constrained least-squares estimators considered in my job market paper for large experiments. So far, I have considered only asymptotics as the number of individuals in the sample population (or the number of repetitions of the experiment to a particular individual over time) grows large. This is sufficient to obtain results for constructing hypothesis tests pertaining to rationalizability by various models. However it is natural to ask about the asymptotic properties of the estimators as instead the number of pairs of alternatives for which data is observed grows large. For example, establishing consistency of these estimators would yield a method of *robustly* recovering preferences, even in the presence of noise, mismeasurement or other sources of error.

Finally, I plan to undertake a collaborative project with experimental colleagues. A natural application would be to test and compare the predictive accuracy of various models of preferences under ambiguity. This would allow for a fine-tuned analysis of ambiguity attitudes and provide an opportunity to select amongst a number of closely related models, and highlight the ability of the tools provided in my job market paper to differentiate between different ambiguity attitudes.

**Industrial Organization**

My research in industrial organization primarily focuses on antitrust economics. In 'Mergers, Entry, and Consumer Welfare,' my coauthors and I investigate the ability of merger-induced entry to be sufficient to counteract the otherwise anticompetitive effects of a profitable merger in a model of differentiated Bertrand competition. Antitrust merger review in both the United States and European Union propose that merger-induced entry that is "timely, likely, and sufficient" might serve to counteract the anticompetitive effects of a merger.[1] Instead, we show that under logit or constant elasticity of substitution (CES) demands, absent efficiencies from the merger, any entry that is sufficient to restore consumer surplus to pre-merger levels necessarily renders the merger itself unprofitable. Such mergers would not be pursued by the relevant parties and thus, by revealed preference, it may be appropriate to infer the existence of barriers to entry in merger review absent evidence of efficiencies.

Moreover, these results extend to nested and random coefficient demand systems unless the entrant is a drastically distant competitor to the merging parties, suggesting robustness to specific demand assumptions.[2] In the presence of efficiencies we establish an analytic framework to guide the empirical analysis of entry in the context in merger review. We apply our findings to the T-Mobile/Sprint merger,

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[1]For the United States, see §9 of the 2010 Horizontal Merger Guidelines of the Department of Justice and Federal Trade Commission. For the European Union see §6 of the Guidelines on the Assessment of Horizontal Mergers under the Council Regulation on the Control of Concentrations between Undertakings. This standard is also used by other antitrust authorities, including the Australian Competition and Consumer Commission and the Canadian Competition Bureau.

[2]However, in such cases one would expect the merger to have only limited impact on the profitability of the potential entrant, rendering merger-induced entry unlikely. Thus our results investigate the sufficiency of entry to restore consumer surplus in the context in which such entry is most likely to actually occur.

using a mix of publicly available data and information from regulatory filings. We show that there is no equilibrium in which both the merger is profitable and there is merger induced entry by DISH. We interpret this as suggesting the Federal District Court may have erred in treating DISH as a merger-induced entrant in clearing the merger.

Looking forward, I plan to continue to pursue projects in antitrust economics. Generally, I am interested in using microeconomic theory to obtain empirical or econometric tests of anticompetitive behavior. I am particularly interested in dynamic models of collusion and the potential for coordinated effects to arise in response to mergers.

## Revealed Preference

My research in revealed preference theory studies the implications of data incompleteness in the non-parametric study of rationality. A classical result in revealed preference shows that when one observes a subject's choice on a rich enough collection of choice sets, the weak axiom of revealed preference is both necessary and sufficient for the choice data to be rationalized by a preference relation. Flavors of this result arise in many applications, where the empirical content of a model is characterized by a context-appropriate variant of the weak axiom, and the assumption of complete data sets. To better understand how robust such characterizations are in practice, in 'How Strong is the Weak Axiom?' I investigate just how far complete data assumptions may be relaxed, while still retaining a suitably powerful weak axiom. I provide a complete characterization of the richness conditions under which the weak axiom suffices for rationalizability, and explore a connection between these results and the classical demand integrability literature.

In 'The Implications of Experimental Design for Choice Data' I show that structure of the collection of choice sets over which decisions are observed has strong implications when one seeks to quantify how far a data set is from rationalizability.[3] I show that often the collection of choice sets intersect in a way that forces choice cycles to rarely occur in isolation. Instead, non-rationalizable behavior, i.e. cyclic choice patterns, generally *propagate*: once a subject has chosen cyclically over some subcollection of sets, there will generally be other choice sets with the property that *anything* the subject chooses on these sets will yield further revealed preference cycles. Rather than treating these knock-on cycles as evidence of a deeper degree of irrationality, I propose an inconsistency index which 'normalizes' the data for these dependencies and, using existing experimental data, highlight that failing to account for these dependencies can in fact lead to reversals in ranking of the relative degree of irrationality of subjects.

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[3]This paper is in the process of being split off from "How Strong is the Weak Axiom." An old, incomplete working paper is available upon request.