Research Statement

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I am an industrial organization (IO) economist developing empirical tools to analyze competition among oligopolistic firms. My research focuses on how firms' strategic decisions shape market outcomes in response to policy (e.g., taxation or trade policy), regulation (e.g., antitrust), and market design (e.g., in online platforms). My work spans four areas: (i) estimation of empirical games, (ii) testing firm conduct, (iii) applied research on competition in non-standard markets. Finally, as a cross-cutting theme, I use (iv) AI/ML to study competition in markets. I describe representative work and new projects in each area below.

i. ***Estimation of Empirical Games***: A key challenge in empirical industrial organization is estimating games when researchers have limited knowledge about the exact information available to firms. In [1] **"Estimation of Discrete Games with Weak Assumptions on Information"** (Magnolfi and Roncoroni, 2023, *ReStud*), we propose a method to estimate static discrete games under *Bayes Correlated Equilibrium*, applying cutting-edge results in game theory for empirical analysis. Our method yields bounds on model parameters under weak assumptions on information, nesting many commonly used information structures. In an application to entry in the Italian supermarket industry, our method finds less competition between supermarkets and malls than found by models with more restrictive assumptions.

[2] **"Estimation of Games under No Regret: Structural Econometrics for AI"** (with Niccolo Lomys, *R&R at JPE*) develops a method to recover primitives from data generated by artificial intelligence (AI) agents in strategic environments. We model AI agents' interaction under the minimal optimality condition of *asymptotic no-regret* (ANR). This approach builds on the standard framework in computer science, as leading algorithms used at scale, e.g., in sponsored search auctions or pricing in digital marketplaces, are based on the ANR paradigm. We first show a theoretical convergence result for ANR dynamics, and then use this result together with the properties of leading AIs to build an inferential procedure for structural primitives of the interaction (e.g., marginal cost in a pricing game). We apply the method to pricing data from a decentralized digital marketplace for used smartphones, estimating sellers' cost distributions and finding lower markups than in centralized platforms.

In new work, [3] **"Robust Identification in Repeated Games: An Empirical Approach to Algorithmic Competition"** (with Cozzolino, Gualdani, Gufler, and Lomys) develops an econometric framework for recovering structural primitives from price or quantity data generated by firms using reinforcement-learning algorithms. Guided by recent evidence that such algorithms can learn to approximate repeated-game equilibria, we impose only minimal optimality conditions implied by equilibrium while remaining agnostic about specific algorithmic designs and the resulting conduct. This

approach yields set identification of primitives with valid confidence regions, offering a practical tool for empirical analysis and regulatory assessment of algorithmic behavior.

ii. ***Testing Firm Conduct***: Understanding how firms compete is crucial either in itself (e.g., to detect collusion), or to build credible models to evaluate policy. In [4] **"Testing Firm Conduct"** (Duarte, Magnolfi, Sølvsten, and Sullivan, 2024, *QE*), we examine approaches for testing non-nested models of oligopoly conduct. We highlight the advantages of the Rivers and Vuong (2002) test under misspecification but note that degeneracy can invalidate inference with this test. To address this, we introduce a definition of weak instruments for testing, link degeneracy to instrument strength, and provide a practical diagnostic. Applying our method to vertical conduct in the yogurt market, we find some instruments are weak with no power, while strong instruments support manufacturers setting retail prices.

Complementing this work, in [5] **"Learning Firm Conduct: Pass-Through as a Foundation for Instrument Relevance"** (with Dearing, Quint, Sullivan, and Waldfogel), we show that differences in cost pass-through across oligopoly models is the economic mechanism that enables falsification of incorrect models. This connects modern instrument-based approaches to earlier methods using regression-based cost pass-through estimates. Our results provide an economic foundation for the modern conduct testing toolkit, guide the ex-ante selection of relevant instruments, and inform instrument selection for particular counterfactuals.

New work on [6] **"Conduct and Scale Economies in Differentiated Product Markets"** (with Duarte, Quint, Sølvsten, and Sullivan, *R&R at AER*) extends our testing methodology to accommodate non-constant marginal costs, a crucial development for analyzing policy across many industries where production scale matters. Applied to the US automobile market, this method allows us to distinguish between models of firm conduct while accounting for economies of scale—both essential for credible tariff policy evaluation. We find evidence of Cournot (quantity-setting) competition and meaningful scale economies in the US auto industry, which changes how tariffs propagate through the market. Our analysis reveals that the complexity of global value chains produces unexpected outcomes when disrupted by stacked tariff policies (e.g., affecting both parts and assembled automobiles), showing how getting the underlying model of competition right is essential for understanding trade interventions.

iii. ***Applied Research on Competition in Non-Standard Markets***: I apply the econometric tools I develop and the broader IO toolkit to study competition in markets with unique features. In [7] **"Regulatory Competition and the Market for Corporate Law"** (Eldar and Magnolfi, 2020, *AEJ:m*), we estimate firms' preferences for corporate governance laws, finding that firms generally dislike anti-takeover statutes protecting officers from liability. We show that Delaware would lose market share if it adopted more pro-management laws, indicating pressure to keep laws shareholder-friendly.

In [8] **"The Competitive Conduct of Consumer Cooperatives"** (Duarte, Magnolfi, and Roncoroni, *RAND*), we study how the ownership structure of consumer cooperatives affects their conduct. Results (including formal conduct testing) show that co-ops exploit their market power, similar to for-profit firms, thus eluding their stated objective of maximizing consumer welfare.

[9] **"The Rise of Urgent Care Centers: Implications for Competition and Access to Health Care"** (Magnolfi, Mommaerts, Serna, and Sullivan, 2024, *JPEm*) examines the entry decisions of ur-

gent care centers (UCCs). We find that while UCCs enjoy some market power, hospital presence deters entry. However, UCCs are just as likely to enter traditionally underserved markets, suggesting they play a role in expanding access to healthcare.

[10] **"Multi-homing Policies and Collusion: Unintended Consequences for Digital Platforms"** (with Higgins, Quint, and Sullivan) is a theoretical examination of policies promoting multi-homing on price-setting (e.g., ride-hailing) and fee-setting (e.g., vacation rentals) platforms. Reducing multi-homing costs benefits consumers under competition, but may reduce buyer and seller surplus under collusion.

In new work, [11] **"An Equilibrium Model of Rollover Lotteries"** (with Compiani and Smith), we develop a novel market framework to analyze state-run lotteries. We model lottery participation as an implicit market where the expected monetary loss is a price for the thrill of gambling. Our framework helps explain several empirical puzzles: why lottery sales rise more than proportionally with jackpot size, why optimal lottery odds scale linearly with population, and why uncapped rollovers may reduce lottery revenues. The analysis provides evidence for the predictive power of risk-neutral behavior in high-stakes gambling decisions, contributing to long-standing questions in decision theory.

iv. ***AI/ML Applications in Industrial Organization***: I am leveraging AI and machine learning techniques to enhance empirical IO methods in several ways. In [12] **"Triplet Embeddings for Demand Estimation"** (McClure, Magnolfi, and Sorensen, *AEJ:m*), we use machine learning to construct product embeddings from crowdsourced comparisons, enabling demand estimation with limited data on product characteristics.

In [13] **"Market Counterfactuals with Nonparametric Supply: An ML/AI Approach"** (with Chiang, Collison, and Sullivan), we develop a flexible approach to perform market counterfactuals using machine learning methods and nonparametric structure from economics. While standard structural methods rely on restrictive assumptions about firm conduct and cost, we propose a data-driven framework that relaxes these constraints when rich market data are available. We use deep neural networks to estimate a nonparametric model of firms' pricing equation within the Variational Method of Moments framework, thus blending economics and AI/ML tools. When used to predict the impact of airline mergers on prices, our method beats both standard structural techniques and purely data-driven approaches.

Finally, [2] and [3], discussed in Section (i), bridge the gap between algorithmic decision-making and structural econometrics, providing tools to study modern markets where AI plays an increasingly important role.

Research Impact

My papers have been included in graduate IO syllabi and reading lists at several leading universities. [4] **"Testing Firm Conduct"** is cited in two chapters of the new *Handbook of Industrial Organization*.

[1] **"Estimation of Discrete Games..."** is discussed in some detail in the new graduate IO textbook "Structural Econometric Modeling in Industrial Organization and Quantitative Marketing: Theory and Applications" by Hortacsu and Joo (2023). I have been invited to present my research at many universities and conferences in the US and abroad.

References

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