

Research Statement

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Health care, financial markets, and the technology sector are markets that feature a small number of firms with products that have opaque pricing or complex characteristics. Firms in these markets often set high prices relative to cost, earning substantial profits. Policy-makers are interested in understanding how to lower prices, improve quality, and increase access in these markets, which can be accomplished by promoting competition.

My research agenda seeks to combine theory and empirics in order to provide insight into the role of information in imperfectly competitive markets. I am particularly interested in markets featuring complex or opaque characteristics that consumers have difficulty understanding. Much of my work focuses on different aspects of health care, including hospitals, health insurance, and pharmaceuticals, where limited information is particularly relevant and potentially problematic. My work often combines an analysis of natural experiments or policy changes with an empirical model based on economic theory, allowing me to answer new research questions that could not otherwise be addressed. Finally, much of my work seeks to understand how the internet has affected markets by making information available to both consumers and firms.

Providing insight into the role of information in markets has important implications for consumer protection regulation and antitrust policy, in addition to implications for consumers and firms. Governments increasingly see their role as mediating the transmission of information and choosing disclosure policies. My work sheds light on how policies that strategically provide information or simplify consumer choice can increase competition and thus help lower prices, improve quality, and increase access in essential markets.

Information about Hospital Prices

In general, patients have difficulty knowing the price they will pay for a service before going to a hospital. One strand of my work examines the implications for patients, hospitals, and insurers when patients are able to obtain information about prices.

In my first paper about price transparency, *Equilibrium Effects of Health Care Price Information* (published in *Review of Economics and Statistics*), I examine the introduction of a state-run website in New Hampshire that allows patients to compare the out-of-pocket price of procedures across different hospitals. I obtained website traffic data and all private medical claims in the state and found new evidence that the price transparency tool not only allowed consumers to choose lower-cost options but also caused a small but significant reduction in hospital prices. These results imply that patients benefit even if they do not use the price transparency tool.

In *An Empirical Model of Price Transparency and Markups in Health Care* (revise and resubmit, *Journal of Political Economy*), I develop a structural model of the market for health care that captures the idea that patients may have incorrect beliefs about prices unless they use a price transparency tool, and this may affect bargaining between insurers and hospitals. While a relatively small selected set of individuals currently use price transparency tools, the model provides insight into the potential welfare effects if a larger fraction of consumers were informed about health care prices or if price transparency tools were combined with alternative incentives for consumers. One of the conclusions is that many consumers have limited incentive to use price transparency tools since most of the potential savings go to insurers, limiting the benefits under current policy.

Given that hospital market power is further exacerbated by the lack of price information, this has motivated other policies to address high prices. In work with University of Michigan PhD student Roslyn Murray and colleagues, we examine a policy in Oregon that caps payments to hospitals for state employees. *Hospital Facility Prices Declined As A Result Of Oregon's Hospital Payment Cap* (published in *Health Affairs*) finds evidence that moderate caps do benefit patients on average but also generate unintended consequences, namely hospitals that raise prices to the cap.

Information about Health Insurance and Financial Products

Choosing a health insurance plan is especially difficult, and individuals have to choose how much time and effort to spend trying to understand and compare alternatives. The incentive and ability to do this research may vary widely across individuals.

In *Endogenous Information and Simplifying Insurance Choice* (published, *Econometrica*), Jihye Jeon and I develop an empirical model in which individuals with higher “stakes” choose to conduct more research and therefore do a better job of choosing among complex options. The model leverages results from the literature on “rational inattention”, a theoretical model of choices when information acquisition is costly (Sims, 2003; Matějka and McKay, 2015). While there is a burgeoning theoretical literature incorporating rational inattention, we are, to our knowledge, the first to estimate a model based on rational inattention that shows how to separately estimate the cost of information while allowing for heterogeneous preferences. We develop a tractable framework that generalizes standard demand models and allows researchers to incorporate initially unobserved product characteristics. We apply the model to the Medicare prescription drug insurance markets and provide guidance on how to simplify choice in order to benefit Medicare recipients. More generally, we argue that the model can provide insight into how to regulate markets with complex products that are difficult for consumers to understand.

In subsequent work, we examine how health insurers may take advantage of uninformed consumers. *Product Proliferation under Rational Inattention: Application to Health Insurance* (published, *AEA Papers and Proceedings*) shows theoretically that insurers can in-

crease profits by offering many similar products when consumers are not fully informed. Empirical evidence from Medicare plans suggests policymakers can promote competition by limiting the number of similar products.

Many similar issues are present in the market for other financial products. In *Why do Index Funds have Market Power? Quantifying Frictions in the Index Fund Market* (working paper), which is joint with Jihye Jeon and Mark Egan and their current/former students Alex Wu and Chuqing Jin, we examine various reasons why the market for index funds is not more competitive. Building on seminal work by Hortaçsu and Syverson (2004), we develop a model incorporating multiple reasons why investors may choose high-fee funds even when very similar funds with lower fees are available, including holding investments for long periods and difficulty researching plans. We incorporate these issues into an empirical model of supply and demand. We find that only 13% of households update their portfolio at least once a year. While this is low, its impact on the fees households pay is limited because people lack information when making an active choice. One implication is that policymakers aiming to increase competition and reduce fees should focus on making it easy to compare funds (e.g., create online transparency tools) rather than making it less costly to switch investments (e.g., reduce short-run capital gains taxes).

Health Care Quality and Information

Some patients may lack information about which doctors or hospitals provide high-quality care. A strand of my work focuses on who has information to choose high-quality doctors or hospitals and how online information affects choices.

In *Broadband Internet Access and Health Outcomes: Patient and Provider Responses in Medicare* (forthcoming, *International Journal of Industrial Organization*), Jessica Van Parys and I examine how the rollout of broadband internet over the period 1999 to 2008 affected health outcomes. We obtained data on 3 million hip and knee replacement surgeries where we observe the zip code of the patient and the surgeon that performed the surgery. We estimate that after a zip code gains broadband internet, the probability of a bad outcome decreases by roughly 5%. We then examine the mechanisms using a structural model. The results imply that much of the effect is due to changes in patient demand for certain doctors, consistent with the idea that patients use the internet to research health care providers or communicate with others and get recommendations. We also find some suggestive evidence that broadband access improves provider quality.

Some patients choose higher-quality doctors than others. Is this due to differences in information or preferences? Understanding this question has implications for addressing disparities in access to health care. Along with Chris Hansman, Andre Veiga, and University of Michigan PhD student Jordan Keener, we examine this question in *Information and Disparities in Health Care Quality: Evidence from GP Choice in England* (reject & resubmit, *American Economic Review*). Using detailed data on physician choice for all of

England, about 56 million individuals, we leverage discontinuities in physician ratings that effectively provide variation in perceived quality. We find evidence that high-income individuals are already informed about GP quality in the absence of the rating system, but low-income individuals are not. Motivated by this evidence, we estimate an empirical model of demand for GPs that accounts for these issues and demonstrate how researchers can credibly determine where patients would go if they were informed about physician quality. There is debate about how to improve access to high-quality health care and reduce disparities in health care quality. Our paper makes the point that differences in what patients know about doctor quality is a significant but often ignored factor that should be taken into consideration.

Online Markets and Pricing Algorithms

One question in a number of my papers is how information technology, including the internet, has affected demand. Another strand of my research agenda focuses on how the internet affects the behavior of firms and enables new pricing strategies.

Competition in Pricing Algorithms (published, *American Economic Journal: Microeconomics*) with Alex MacKay seeks to provide a new lens through which to view competition in online markets in light of online pricing technology and the information available to firms. We collect high-frequency price data for over-the-counter drugs across five major U.S. online retailers and document that online retailers differ widely in how fast they can adjust prices. We provide evidence that the most sophisticated retailers with the fastest pricing can quickly collect information on rivals' prices and automatically update their prices in response. Based on these facts, we propose a model in which firms compete by setting a pricing formula that depends on rivals' prices rather than setting a price. The model also allows firms to differ in the speed at which they can adjust pricing. The model implies that pricing algorithms can soften competition, allowing online retailers to sustain higher prices and profits. In a recent working paper, we extend these previous results to consider a new mechanism by which high-speed pricing algorithms may facilitate collusion in a repeated-game setting (Brown and MacKay, 2023a).

The anticompetitive effects of pricing algorithms have moved to the forefront of policy discussions. We have since been asked to write articles for policymakers and our research has been cited by antitrust authorities, the White House, the OECD, and the U.S. Senate.¹

Market Power in Developing Countries

Issues related to imperfect competition and information are very relevant in developing countries. In work with Eduardo Montero, Carlos Schmidt-Padilla, and Micaela Sviatschi, we examine a unique setting in El Salvador featuring competition and collusion between

¹See, for instance, Brown and MacKay (2022), White House (2023), OECD (2023), U.S. Department of Justice (2023), and Senate Banking Committee (2024).

criminal organizations and examine the implications for retail goods. In *Market Structure and Extortion: Evidence from 50,000 Extortion Payments* (forthcoming, *The Review of Economic Studies*), we develop a theoretical model to examine the incentive to collude when criminal organizations collect extortion from businesses. We then leverage unique data on extortion payments and sales from a large wholesale distributor in El Salvador. We find that collusion between gangs, enabled by the start of a non-aggression pact in 2016, increases extortion rates. We find high pass-through of these costs to retail prices for pharmaceutical drugs. Overall, the paper provides evidence that models from industrial organization can provide insight into competition between criminal organizations.

Future work

In my ongoing research, I aim to further advance the literature on information frictions in empirical industrial organization, both in terms of developing new empirical methods based on theory and examining supply-side implications of information.

I have preliminary work examining how policymakers can improve the functioning of the Medicaid Managed Care market, an understudied \$0.5 trillion market in which states contract with provide health insurers to provide health care to low-income individuals. The project will provide guidance for states choosing Medicaid Managed Care plans in light of the fact that individuals face severe information frictions when choosing plans. One goal is to highlight that the value of choice is smaller when patients are uninformed, and therefore states should contract with a limited set of insurers.

I am also interested in understanding the incentive for firms to introduce products or change product characteristics when consumers are uninformed. In *Price Dispersion and Product Proliferation Under Consumer Inertia: Evidence from the ETF Market*, which is ongoing work with previous coauthors, we provide evidence in the index fund market that firms often offer multiple products that are very similar, some of which target unsophisticated or inertial consumers and have higher prices. We are estimating a dynamic entry model in order to provide insight into when limiting product proliferation can be welfare increasing in this setting.

Finally, I plan to further contribute to the nascent literature on pricing algorithms. In *Collusion and Coercion with Naive Rivals* (working paper), Alex MacKay and I extend our previous work to consider a setting in which at least one firm considers repeated-game dynamics and show that a sophisticated firm with a high-speed pricing algorithm can gain an even larger competitive advantage. We plan to supplement the model with additional empirical evidence from markets with pricing algorithms. More generally, we plan to use both theory and empirics to further examine the implications of commitment and pricing frequency when firms adopt pricing algorithms.

My Work

- Brown, Zach Y**, “An Empirical Model of Price Transparency and Markups in Health Care,” 2018.
- , “Equilibrium Effects of Health Care Price Information,” *Review of Economics and Statistics*, 2019, 101 (4), 699–712.
- **and Alexander MacKay**, “Are online prices higher because of pricing algorithms?,” *Brookings Institute*, 2022.
- **and** — , “Collusion and Coercion with Naive Rivals,” *SSRN 4380895*, 2023.
- **and** — , “Competition in Pricing Algorithms,” *American Economic Journal: Microeconomics*, 2023, 15 (2), 109–156.
- **and Jessica Van Parys**, “Broadband Internet Access and Health Outcomes: Patient and Provider Responses in Medicare,” *Forthcoming, International Journal of Industrial Organization*, 2024.
- **and Jihye Jeon**, “Product Proliferation under Rational Inattention: Application to Health Insurance,” *American Economic Association Papers and Proceedings*, 2021, 111, 554–559.
- **and** — , “Endogenous Information and Simplifying Insurance Choice,” *Econometrica*, May 2024, 92 (2), 881–911.
- , **Christopher Hansman, Jordan Keener, and Andre F Veiga**, “Information and Disparities in Health Care Quality: Evidence from GP Choice in England,” *National Bureau of Economic Research*, 2023, WP31033.
- , **Eduardo Montero, Carlos Schmidt-Padilla, and Maria Micaela Sviatschi**, “Market Structure and Extortion: Evidence from 50,000 Extortion Payments,” *Forthcoming, Review of Economic Studies*, 2024.
- , **Mark L Egan, Jihye Jeon, Chuqing Jin, and Alex A Wu**, “Why do Index Funds have Market Power? Quantifying Frictions in the Index Fund Market,” *National Bureau of Economic Research*, October 2023, WP31778.
- Murray, Roslyn C, Zach Y Brown, Sarah Miller, Edward C Norton, and Andrew M Ryan**, “Hospital Facility Prices Declined As A Result Of Oregon’s Hospital Payment Cap,” *Health Affairs*, 2024, 43 (3), 424–432.

Other Citations

- Hortaçsu, Ali and Chad Syverson**, “Product Differentiation, Search Costs, and Competition in the Mutual Fund Industry: A Case Study of S&P 500 Index Funds,” *The Quarterly Journal of Economics*, 2004, 119 (2), 403–456.
- Matějka, Filip and Alisdair McKay**, “Rational Inattention to Discrete Choices: A New Foundation for the Multinomial Logit Model,” *American Economic Review*, 2015, 105 (1), 272–298.
- OECD**, “Algorithmic Competition,” OECD Competition Policy Roundtable, page 14, <http://www.oecd.org/daf/competition/algorithmic-competition-2023.pdf>, 2023.
- Senate Banking Committee**, “Letter to Amazon/Walmart from Chair of Senate Committee on Banking, Housing, and Urban Affairs,” May 9, 2024.
- Sims, Christopher A**, “Implications of rational inattention,” *Journal of monetary Economics*, 2003, 50 (3), 665–690.

U.S. Department of Justice, “Doha Mekki Remarks as part of Global Competition Review,” <https://www.justice.gov/opa/speech/principal-deputy-assistant-attorney-general-doha-mekki-antitrust-division-delivers-0>, 2023.

White House, “Economic Report of the President,” Executive Office of the President, Page 233, <https://www.whitehouse.gov/wp-content/uploads/2023/03/ERP-2023.pdf>, 2023.