LYDIA CAO

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EDUCATION

Northwestern University, Kellogg School of Management *2021 - Present*
Managerial Economics and Strategy , Ph.D. Candidate
Managerial Economics and Strategy , M.S

Boston College *2015 - 2019*
BS in Mathematics and BA in Economics, *magna cum laude*

RESEARCH

Fields: Industrial Organization, Health Economics, Labor Economics
Advisors: David Dranove (*chair*), Gaston Illanes, Molly Schnell, Shengmao Cao

Working Paper

Hospital Mergers and Physician Allocation, with Jin Yang.

We study patterns in physician allocation following hospital mergers in the US and their implications on healthcare provision. Using Medicare data and the Florida Discharge database, we document that post-merger: (1) More physicians now work simultaneously at both acquiring and target hospitals as multi-homers, who in general see more patients than single-homers, and the change is likely due to the removal of firm boundaries. (2) More physicians move from one side of the merged hospitals to the other, with moves from acquiring to target hospitals occurring more frequently in specialties where the acquirer initially had relatively more physicians than the target. (3) The average number of patients seen per physician rises at target hospitals, and the increase is partially driven by the reallocation of physicians. These findings suggest that hospitals may reorganize their internal organizations post-merger to optimize physician hiring and improve matching efficiency.

Work in Progress

When Payers Intervene: Insurer Restrictions, Physician Expertise, and Cost Control *(JMP)*

Prescription drug spending has grown rapidly, prompting insurers to adopt utilization management (UM) protocols that restrict access to high-cost drugs. I study the welfare trade-offs of UM as a tool of insurer cost control. First, by imposing hassle costs, UM limits physicians' ability to act on their private information about patient–drug match quality. Second, by shaping prescribing and thus demand for drugs, UM serves as a bargaining instrument that strengthens insurers' leverage in price negotiations with drug manufacturers. Using Medicare Part D data on antidiabetic drugs, I provide causal evidence that UM reduces the use of restricted drugs, with more pronounced effects among physicians who are likely better informed about patient health status, consistent with physician learning about patient types over time. To quantify the welfare implications of UM, I estimate a structural model of physician prescribing and insurer–manufacturer bargaining. The estimates show that physicians are relatively insensitive to out-of-pocket costs, while uncertainty about patient-specific drug effectiveness declines substantially over time. Relative to no restrictions, UM reduces total expenditure by 4%, with only a 0.1% decrease in consumer surplus, but imposes administrative costs on physicians. On the supply side, I develop an insurer-manufacturer bargaining model that clarifies UM's potential to help insurers negotiate lower prices. Overall, UM is an effective tool for cost containment and price negotiation, with limited direct impact on patient welfare, but adds to the administrative burden borne by physicians. Optimal policy must balance cost savings, price effects, and physician burden, accounting for both direct effects on prescribing and indirect effects through equilibrium prices.

Dynamic Effect of Innovation Policy: Evidence from US Pharmaceutical Industry, with Amelia Yao.

Individual Contributors in Modern Organizations with Nicola Bianchi, Benjamin Friedrich, and Kieu-Trang Nguyen.

PROFESSIONAL ACTIVITIES

Seminars and Presentations:
2024 Northwestern Kellogg Strategy Brownbag Seminar, Northwestern Economics Department IO Student Lunch

RESEARCH EXPERIENCE

Research Assistant to David Dranove	*2022, 2024 -*
Research Assistant to Benjamin Friedrich	*2024*
Empirical Research Fellow at Kellogg School of Management	*2019 - 2021*
Research Assistant to Julie Mortimer	*2018 - 2019*
Research Assistant to Susanto Basu	*2017 - 2018*

AWARDS AND HONORS

Kellogg School of Management Graduate Fellowship	*2021 - 2026*

TECHNICAL SKILLS

Programming: Matlab, Stata, Python, LaTeX
Languages: Mandarin (native), English (fluent)

I study economic phenomena in three areas: (1) interactions between insurers and physicians, (2) non-price effects of mergers in the healthcare sector, and (3) innovation policies in the pharmaceutical industry. Below, I summarize my main projects and explain how I would benefit from the fellowship.

Interactions between insurers and physicians. My research in this area focuses on the welfare consequences of utilization management (UM) — the set of insurer-imposed restrictions, including step therapy, prior authorization, and formulary exclusion, that govern physician prescribing. The relationship between insurers and physicians is a classic site of delegated decision-making under asymmetric information: insurers bear the financial cost of treatment but cannot directly observe patient health status, while physicians possess private clinical knowledge but do not fully internalize costs. A large literature in health economics has studied how insurers use financial incentives — capitation, fee schedules, cost-sharing — to align physician behavior with cost control objectives, and how managed care more broadly affects utilization and quality of care. UM represents a distinct and increasingly prevalent instrument in this toolkit, one that operates through administrative barriers rather than price signals, and whose welfare implications remain contested. My paper studies these implications through two channels identified in this literature but rarely analyzed jointly. First, by imposing hassle costs, UM limits physicians' ability to act on their private information about patient–drug match quality; I provide causal evidence that UM's effects on utilization are more pronounced among physicians likely to be better informed, consistent with physician learning about patient types over time. Second, and less studied, UM shapes prescribing and thus drug demand in ways that strengthen insurers' bargaining leverage in price negotiations with manufacturers, lowering equilibrium drug prices. Using Medicare Part D data on antidiabetic drugs and a structural model of physician prescribing and insurer–manufacturer bargaining, I find that UM reduces total drug expenditure by 4%, with only a 0.1% decrease in consumer surplus, but imposes meaningful administrative costs on physicians — costs borne disproportionately by the most informed. Optimal UM policy must therefore balance direct cost savings, equilibrium price effects, and physician burden, accounting for the informational role physicians play in matching patients to treatments.

Non-price impacts of mergers. While the merger literature has largely focused on price and quantity outcomes, I am interested in non-price effects, such as organizational synergies and labor reallocation. In my project "*Hospital Mergers and Physician Allocation*" (joint with Jin Yang), we examine how hospital mergers affect internal structures through changes in physician allocation across locations and tasks. We find that physicians are more likely to multi-home and reallocate between merging parties—especially in specialties with low private practice shares, among geographically proximate hospitals, and where pre-merger service portfolios are imbalanced.

innovation policies in the pharmaceutical industry. Pharmaceutical innovation is long-term and costly, and policy interventions can shift firm behavior dynamically. In "*Dynamic Effects of Innovation Policy: Evidence from the U.S. Pharmaceutical Industry*" (joint with Amelia Yao), we study the impact of the FDA's Breakthrough Therapy Designation (BTD) on firms' R&D decisions. We argue that BTD increases the relative return to first approval, incentivizing firms to prioritize speed over quality. We plan to estimate a structural model of clinical trial investment to assess the short- and long-term effects of BTD on innovation outcomes.

Motivating for attending the mentoring program. My dissertation research sits at the intersection of health economics and the economics of aging: I study utilization management in Medicare Part D, a program that serves primarily elderly beneficiaries, and the welfare consequences of insurer restrictions on physician prescribing for this population. The NBER Mentoring Program on Aging and Health Economics Research offers a rare opportunity to engage with senior scholars whose expertise spans the empirical and institutional dimensions of health and aging that are central to my work, and whose feedback would be invaluable as I develop my structural model and counterfactual policy analysis. I am particularly motivated by the program's emphasis on identifying promising research questions, as I am actively working to extend my current project and map out a research agenda in aging and health economics more broadly. The optional sessions on healthcare administration align directly with my focus on utilization management as an administrative tool, and I hope to use the workshop to both deepen my methodological toolkit and build connections within the health and aging economics community.