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NBER Digital Economics & AI Tutorial

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I am Jerry Ma, a third-year Ph.D. candidate in Economics at the University of Chicago. I am excited to apply for the Spring 2025 NBER Digital Economics & AI Tutorial to further my research skills in what I view as one of the most promising and rapidly evolving areas of economics. As Generative AI matures from a nascent curiosity into a widely-deployed technology, the resulting implications for market structure, competition policy, and the economics of innovation stand to profoundly influence our discipline. Certain AI & digitization-driven changes may fit within existing economic frameworks, while others may require the development of new ways of thinking. I am eager to learn from leading scholars and advance my research interests in this area of study.

Academic program information

At the University of Chicago, I have completed the first two years of Ph.D. coursework in Economics, with field specializations in industrial organization and econometrics. My IO coursework closely tracks the typical graduate IO curriculum, along with specialized coursework in market design. My econometrics coursework includes specialized coursework in Bayesian econometric methods, applied microeconometrics, and causal machine learning. As a third-year student, I participate in various research seminars and workshops in applied microeconomics and econometrics.

I am also pursuing a joint program with Yale Law School, where I am finishing my final year in the J.D. program. At Yale, I pursue legal coursework and interscholastic competitions on technology, corporate finance, taxation, antitrust, and intellectual property. I also served as student director of the Financial Markets and Corporate Law Clinic.

Research interests & ongoing projects

My research interests lie in the union (and sometimes the intersection) of AI & other emerging technologies, intellectual property, and industrial organization. The research questions that I find most fascinating often arise from my past careers as an AI researcher, a patent agent, and an antitrust enforcer at the Department of Justice.

Ongoing projects and explorations

What explains GenAI's inconsistent skill bias? AI and other technologies cannot be viewed as abstractions, but should be studied in light of their real-world contexts. This is particularly underscored by the emerging body of work studying specific "in-the-wild" deployments of AI systems, which reveal that the impacts of AI on worker productivity can differ sharply by use case and institutional setting. For instance, Brynjolfsson et al. (2023) find in a call center setting that AI's benefits accrue to more novice workers. Dell'Acqua et al. (2023) and Hoffmann et al. (2024) discover similar results in the worlds of management consulting and software development. On the other hand, Toner-Rodgers (2024)'s recent study of an R&D lab's AI system finds that the highest-skilled workers gain the most out of the AI system.

I am developing a theoretical model that explores this contrast through two dimensions: *cognitive intensity* (i.e., how much a given task benefits from deliberation and counterfactual reasoning) and *inference-time compute* (i.e., how well the AI system is able to leverage increased compute), the latter of which is an increasingly critical element of AI systems that is not explicitly captured in Dell'Acqua et al. (2023)'s "jagged frontier" model of AI capabilities. I hope to pair this model with a metastudy of empirical work on GenAI's workplace impacts toward a framework for reasoning about the directionality of skill-biased change arising from specific deployments of GenAI.

Patent subject matter eligibility and software innovation What sorts of inventions can be patented? Inventors as early as Samuel Morse have been confronted with this question, discovering the line between patentable subject matter (such as the telegraph machine) and unpatentable subject matter (such as the general concept of text communications via electromagnetism). In the U.S., the present standard for "patent subject matter eligibility", as this question is known in the legal community, arises out of a pair of Supreme Court rulings called *Alice/Mayo* (2012–2014). Since these rulings, policymakers, courts, and industry stakeholders have contested the effects of the resulting legal framework. This issue is particularly pressing for software-dependent technologies such as artificial intelligence, for which technological advancements often challenge traditional notions of patentability.

I am investigating how variations in the legal application of patent subject matter eligibility standards influence patenting behavior and downstream innovation in critical technologies. I hope to leverage two sources of exogenous variation: administrative policy changes, such as the Patent Office's 2019 Patent Eligibility Guidance, and examiner-specific heterogeneity in applying eligibility criteria (this latter approach inspired by Sampat and Williams (2019)).

By linking patent examination records with novel datasets in the software-related arts, my analysis will measure effects of perturbing the patentability standard on patent filings and follow-on innovation. I hope to use this work to contribute to the larger legal and policy debates surrounding subject matter eligibility, which are highly contentious across all three branches of governments yet are often untethered from empirics.

Algorithmic pricing & collusion: legal doctrine and economic theory When does the use of AI and other algorithmic methods in pricing transactions cross the line into impermissible collusion? Recent cases such as *U.S. v. Realpage, Inc.* stand to test this question in the courts—but in the meantime, I hope to contribute to developing the legal doctrine in this area from economic first principles. For instance, does it matter whether the algorithms are being used on the bid-side or ask-side of a market? To what extent do claims of collusion rest on the methods themselves versus the data underpinning such methods? I am currently exploring some early-stage ideas in this area, building upon existing literature in tacit collusion and algorithmic pricing, and hope to develop these explorations into a formal research project over the coming year.

References

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