NBER Digital Economics and AI Tutorial

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Academic Experience

I am completing a Ph.D. in Marketing at the University of Southern California (USC). My advisor is Davide Proserpio. I joined USC in Fall 2020 and intend to graduate in May 2025. Before joining the Ph.D. program, I completed my undergrad in Statistics and Computer Science at the University of Wisconsin, Madison in May 2020.

Dissertation Committee

My dissertation committee consists of Davide Proserpio, Dina Mayzlin, Lan Luo, Nikhil Malik, and Odilon Camera. Davide Proserpio is the chair of my committee. My dissertation is titled: "Two Essays on the Consequences of Platform Design and Platform Entry on Consumers and Firms".

Research Statement

My research focuses on the economics of digital platforms, with an emphasis on studying the downstream consequences of digital platform design choices and digital platform entry on consumers and firms. My work utilizes various methods, such as causal inference, machine learning, econometrics, analytical economic modeling, and experimental design, to generate novel insights that speak to firms, consumers, and policymakers.

My current research pipeline concentrates on the digital advertising and sports gambling contexts. I have two papers in the digital advertising space: "Information Signals in Sponsored Search: Evidence from Google's BERT", with Davide Proserpio, which studies the impact of Large Language Model (LLM) usage in the context of sponsored search, and "The Moderating Role of Ad Clutter in Digital Advertising", with Sean Melessa and Paul Hoban. In the context of sports gambling, I have one working paper titled "The Financial Consequences of Legalized Sports Gambling", with Brett Hollenbeck and Davide Proserpio. Paper abstracts are below.

Information Signals in Sponsored Search: Evidence from Google's BERT

We study how improvements to search engine interpretation algorithms and the information signals they generate affect sponsored search markets. We do so by analyzing changes in the number of bidders and cost-per-click (CPC) per query auction following Google's October 2019 rollout of Bidirectional Encoder Representations from Transformers (BERT). In aggregate, BERT increases the number of bidders but minimally changes CPC. Given that queries of different lengths have different amounts of information, we analyze how query length moderates the effect of BERT. Despite an increase in the number of bidders across all queries, CPC increases for shorter queries but declines as query length increases. We then develop a theoretical auction model to understand the mechanism driving these findings and make predictions about future algorithm updates. Our results offer insight into the economic impact of AI and Large Language Models (LLMs) on advertising markets and help advertisers prepare for future algorithm updates.

The Financial Consequences of Legalized Sports Gambling

Following a 2018 ruling of the U.S. Supreme Court, 38 states have legalized sports gambling. We study how this policy has impacted consumer financial health using a large and comprehensive dataset on consumer financial outcomes. We use data from the University of California Consumer Credit Panel, containing credit rating agency data for a representative sample of roughly 7 million U.S. consumers. We exploit the staggered rollout of legal sports betting across U.S. states and evaluate two treatment effects: the presence of any legal sports betting in a state and the specific presence of online or mobile access to betting. Our main finding is that overall consumers' financial health is modestly deteriorating as the average credit score in states that legalize sports gambling decreases by roughly 0.3%. The decline in credit score is associated with changes in indicators of excessive debt. We find a substantial increase in average bankruptcy rates, debt sent to collections, use of debt consolidation loans, and auto loan delinquencies. We also find that financial institutions respond to the reduced creditworthiness of consumers by restricting access to credit. These results are substantially stronger for states that allow online sports gambling compared to states that restrict access to in-person betting. Together, these results indicate that the ease of access to sports gambling is harming consumer financial health by increasing their level of debt.

The Moderating Role of Digital Ad Clutter

It is unknown if, how, and to what extent digital ad clutter impacts digital advertising. 19 field studies were conducted detailing the interactions between nearly 1 million consumers, 85 thousand publishers, and 19 companies. These studies found that the real-world relationship between digital ad exposure and consumer conversions was statistically moderated by ad clutter in these data. Two separate eye-tracking experiments were conducted using custom websites. These experiments found that clutter increased aggregate viewership of the ads served, while deferentially impacting ad-slot positions. Finally, two psychological surveys were administered and found that digital ad clutter

reduced ad memory and attitudes towards the ads shown in these surveys. These studies provide evidence that clutter is a relevant variable in digital marketing, while shedding light on potential mechanisms driving its effects. Implications for advertisers and publishers are discussed.