1180 Observatory Drive
Madison, WI 53706
jackcollison.github.io
jcollison@wisc.edu
(715) 212-4370

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Admissions Committee
Digital Economics and AI Tutorial
National Bureau of Economic Research

Dear admissions committee,

My name is Jack Collison and I am a rising third-year Ph.D. student in Economics at the University of Wisconsin-Madison. My research interests lie in the field of Industrial Organization, with a particular focus on two-sided platforms, network effects, and augmenting traditional methods with novel developments in machine learning. I am especially excited about using flexible methodology at the intersection of Computer Science and Economics to answer difficult and interesting questions.

During my graduate studies at the University of Wisconsin-Madison thus far, I have taken the full second-year sequences of industrial organization, econometrics, and health economics. I also took a doctoral course on non-linear optimization in theory and practice in the Computer Science and Statistics Departments. Prior to my doctoral coursework, I received a Master's in Statistics at Stanford where I took graduate- and doctoral-level courses in machine learning, causal inference, and artificial intelligence.

In addition to my coursework, I have been working on several research projects which I describe in detail in the following pages. The project descriptions highlight my research interests and show that the Tutorial in Digital Economics and AI is an excellent fit for me. I would greatly benefit from the tutorial as it will allow me to interact with leading researchers, receive feedback on my ongoing research, and gain knowledge of the field.

Thank you for your time and consideration.

Sincerely,
Jack Collison

Understanding the Value of Platform Intermediaries

with Toren Fronsdal

We use unique data from a digital business-to-business platform to measure the value of platform intermediaries with market power. We plan to use a bargaining framework to determine the extent to which platforms gain bargaining power under network effects and estimate the role of platform intermediaries in gains in productivity. We will also examine the effects of a "harvesting" strategy in which the platform appeared to price below cost until significantly increasing the prices later.

High-Dimensional Markov Perfect Equilibrium in Dynamic Oligopoly

Awarded Juli Plant Grainger Summer Fellowship

Dynamic oligopoly methods are analytically intractable and require numerical methods to solve for Markov perfect equilibria. A large methodological literature aims at solving these models via approximation of value functions. However, it remains difficult to introduce heterogeneity in dynamic models due to the curse of dimensionality. I propose a nested oblivious equilibrium concept where standard oblivious equilibrium concepts are augmented with data-driven approaches to identify clusters of similar firms that compete more closely with one another.

Predictive Tools for Merger Simulation

with Harold Chiang, Lorenzo Magnolfi, and Chris Sullivan

Antitrust agencies face the complex task of deciding whether to bring enforcement action to proposed mergers. They must predict whether the merger is likely to result in negative economic consequences. While a variety of tools is used for this purpose, merger simulation using a full-fledged economic model is the most complex and sophisticated method for making such prospective assessments. In this project, we re-examine the merger simulation toolkit and propose a more flexible approach. When the data are sufficiently rich, we can abandon restrictive models of conduct and use data-driven algorithmic model selection procedures. We apply our method to retrospectively predict the impact of the American Airlines and US Airways merger and find that our approach may yield more accurate predictions of the average change in prices.

The Impact of Online Food Delivery Services on Restaurant Sales

Awarded Anna Laura Myers Prize for Outstanding Honors Thesis

This study presents empirical evidence on the crowding-out effects and market expansions induced by the staggered entry of online food delivery services. Difference-in-differences methodology reveals that 30-50 percent of every dollar spent on online food delivery services is incremental, while the rest is drawn away from brick-and-mortar sales. These findings are heterogeneous across

different types of consumption, suggesting that convenience and pre-existing spending habits drive the level of substitution. Year-over-year analysis suggests that there is incremental cannibalization of brick-and-mortar restaurant sales. Back-of-the-envelope calculations show an increase in restaurants' revenues but a decrease in profitability.

The Impact of Chicago's Ride-sharing Tax

I examine the effects of a new tiered tax on Chicago's ride-sharing markets which aimed to (i) reduce congestion, (ii) induce pooled rides, and (iii) generate revenue. Difference-in-differences and regression discontinuity in time designs reveal a significant surge in the share of pooled rides, particularly in heavily taxed areas of the city. Aggregate ride-share utilization decreased, some of which was diverted to taxis, and the labor supply of ride-share drivers decreased. A structural model of demand shows that the tax results in a decrease of more than $200,000 in consumer surplus per day. Taxis benefited and ride-sharing platforms' profits decreased significantly. Drivers, especially those who multihome, are hurt by the policy.

Dynamic Demand of Electric Vehicle Technology Adoption

with Panle Jia Barwick and Shanjun Li

We analyze the underlying factors that drive the quick adoption of electric vehicles in the United States. Vehicle attributes have improved significantly: range has more than doubled, price has fallen, and charging networks have expanded rapidly. We propose a dynamic model of demand in order to examine optimal (dynamic) subsidy schedules for charging stations and electric vehicle purchases.

Attention and Welfare in Selection Markets

with Toren Fronsdal, Dominic Russel, and Claire Shi

Measuring welfare in selection markets is a difficult but policy-relevant task across a variety of industries. Typical approaches rely on revealed preference in order to estimate welfare; however, recent literature shows the importance of the malleability of attention in decision-making. Using experimental design to manipulate attention in loan markets on a business-to-business digital platform, we propose a sufficient statistics approach to identify the effects of attention and behavioral biases on estimates of welfare in selection markets.