Application for NBER Economics of Digitization Tutorial
Michael Sullivan

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Course of graduate study
I am a fourth-year PhD student at Yale University's Department of Economics, where I have been enrolled continuously since 2017. My major field of study is industrial organization and my minor field of study is econometrics. I passed written qualifying exams in microeconomics and macroeconomics after my first year of study; I passed oral qualifying exams (with distinction) in industrial organization and econometrics after my second year of study; and I advanced to candidacy after my third year of study.

Research interests
Introduction
My primary research interests relate to network effects in online industries and competition in e-commerce markets. My work in both of these areas involves both empirical analysis and the development of methods. The rest of this section of my application summarizes two of my ongoing projects.

Network externalities in the dating website industry
This paper considers the identification of discrete-choice models featuring network externalities (i.e. effects on consumers' choice-specific payoffs of other consumers' decisions) and uses such a model to analyze the role of network externalities in the US dating website industry. My identification analysis shows that discrete-choice models with network externalities are generally not identified with market-level data alone, but that microdata allows for the construction of instrumental variables that identify the model. Using online browsing data, I estimate a model of dating website choice and find evidence of considerable network externalities. In my preferred specification, an inframarginal user of a site values a 10% increase in the site's usership at $11.11/month, which is about one third of the most popular site's price. My estimates suggest that increased market concentration would harm consumers; in particular, I find that welfare losses from decreased variety and increased prices outweigh the gains from network externalities associated with a move to monopoly.

Sources of limited consideration and market power in e-commerce
Much of the literature on demand for goods sold online relies on search costs to justify (i) price dispersion across stores selling physically identical products and (ii) consumers' limited consideration of available online sellers. But vertical differentiation between retailers, store loyalty, and heterogeneous tastes for retailers provide alternative explanations for price dispersion and limited search in e-commerce. I study the contributions of these aspects of consumer preferences to search behavior and retailer market power in the context of contact lens e-commerce. The contact lens setting is suitable for studying consumer search because consumers require brand-specific prescriptions to purchase lenses online, enabling the researcher to rule out cross-brand search and focus on cross-store search. Consumers in my data exhibit severely limited consideration: 83% of their search efforts involve a visit to only

one store. Additionally, the consumer pays on average 16% above the minimum available price for her prescribed brand. My paper proposes a model of sequential consumer search and estimates the model on a panel dataset of search efforts. A novel combination of inequalities implied by Weitzman's (1979) optimal sequential search strategy and a distributional assumption on search costs yields rank-order logit choice probabilities that simplify the estimation of the model. I find that store loyalty and consumers' persistent idiosyncratic tastes for particular stores largely explain why consumers visit few stores and pay prices above the minimum prices available. Additionally, decreasing search costs increases the average amount that the consumer pays for contact lenses above the minimum available price. This is because lower search costs help the consumer find stores matching her tastes in non-price dimensions. Last, store loyalty and persistent idiosyncratic tastes for stores provide online retailers with considerable market power whereas search costs have little effect on equilibrium retailer markups.

Committee members
Professors Steven Berry, Philip Haile, and Katja Seim (all at Yale)