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Research Proposal

I strive to use solid empirical methods to solve interesting empirical industrial organization problems with significant managerial implications. The substantive areas I am currently interested in include digital markets, new media, innovation and intellectual property. Methodologically, my research extensively applies empirical industrial organization, econometrics, big data and machine learning techniques.

This proposal includes two ongoing research projects.

Mobile App Platform Choice

Since Apple and Google launched their mobile application (app) stores in 2008, the market for mobile apps has experienced rapid growth and represents an enormous business opportunity. The success of an app platform relies on the presence of a great variety of innovative and high-quality apps. Given the existence of multiple app platforms, a fundamental question in the app industry is how app developers choose which app platform to enter.

This paper studies the platform choice decisions of app developers and the implications for app market evolution. It is made feasible by employing a unique and big daily-level panel dataset that contains information on every app in the two leading app stores, Apple's App Store and Google Play, over a 2-year period. Combining machine learning techniques for big data problems and computationally efficient econometric approaches, I construct and estimate a structural model on heterogeneous apps' platform choice decisions under an incomplete information game framework.

I find that in general low-quality apps make the platform less favorable for high-quality entrants. In Google app store, the presence of low-quality apps induces more low-quality apps to enter, while Apple app store exhibits strong competitive effects among high-quality apps. Increasing smartphone user base and improving user engagement are very useful measures to accelerate the platform expansion, but these policies also encourage many low-quality apps to enter. Regulations on low-quality apps and attenuating competition are more effective attracting high-quality apps. Platforms can bundle these policies to achieve the optimal market design.

Timely versus Quality Innovation in App Market

The project coauthored with Professor Denis Nekipelov (Department of Economics, University of Virginia) and Professor Minjung Park (Haas School of Business, UC Berkeley), studies the timings and quality of cross-platform app entry under the threat of competitors' entry. Apple and Google play are dominant platforms where users of portable electronic devices with iOS and Android operating systems can purchase and download applications for those devices. The applications ("apps") are developed and brought to the platforms by a large number of independently operating developers. It is a highly competitive dynamic marketplace where it is essential for the developers to keep innovating by both upgrading their existing apps and introducing new apps in order to generate revenues.

In this project we use a unique and comprehensive dataset containing information regarding apps on iTunes and Android platforms. Using a combination of techniques from the Computer Science literature, we were able to identify and validate the complete set of developers that operate on both platforms as well as the same apps that were introduced on both platforms. Using this matched dataset we study how the threat of competitors' entry influences the timing and quality of app entry.

In particular, we find that the threat of competitors' entry can have a sizeable negative impact on the quality of an app under development by forcing the developer to introduce the app prematurely before it has been properly tested and debugged. Our reduced form analysis demonstrates varying effects of this phenomenon depending on both the size of the developer and its competitors' and the sparcity of the product space on a given platform. Then we develop and estimate a structural strategic model of timing and quality decisions of the cross-platform app introduction. We use novel techniques from the Machine Learning literature to model the beliefs of developers in our semiparametric two-step estimator. The estimated structural model is then used to analyze the effects of various counterfactual changes, such as an increase in demand for certain app categories, transfers from the platform to the developers as well as 'A+B'-type contracts between the platform and the developers, on the resulting app quality.