Application for NBER Project on the Economics of Digitization Tutorial

Contact information

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Course of Study

I am in my sixth year of the economics PhD program at the University of Virginia (UVa). I received an M.A. in economics in December of 2013, completed the requisite coursework for the PhD program in the spring of 2014, and my dissertation proposal was accepted in April of 2015. I expect to complete my dissertation in the spring of 2018. My advisors are Simon Anderson, Federico Ciliberto, and Gaurab Aryal.

In my coursework my primary area of study was industrial organization (IO). The two-course IO sequence consisted of a theoretical course with Simon Anderson, and an empirical course with Federico Ciliberto. The theoretical course spanned a wide variety of topics, with particular emphasis on logit demand, price discrimination, and the theory of two-sided markets. The empirical IO course again covered a wide variety of topics, with particular focus on BLP-style demand estimation, the modeling and estimation of entry games, and a broad overview of dynamic models. In addition, I have completed or sat in on a number of econometrics courses. In particular, I sat in on a course on Big Data Econometrics taught by Denis Nekipelov in the spring of 2015.

Research Interests

I study how the digitation of consumer goods and consumer good markets is changing how firms compete how consumers and firms interact. As an example, my dissertation studies how the digitization of consumer goods affects firms product innovation behaviors. I study this question empirically, using a dataset I have built on smartphone application (app) markets on Apple's mobile platform.

Many categories of consumer goods are currently undergoing a process of digitization, where products are becoming increasingly software-dependent and internet-connected. These changes provide firms with two new strategic tools: The ability to monetize the *use* of their products, and the ability to continue update their products after the consumer has purchased it. These changes have the potential to change the nature of competition in durable good industries — rather than competing primarily through prices and longer-term innovation, firms will be able to differentiate themselves through shorter-term updates. In a standard durable goods model, firms compete against other firms to make a sale, and against the consumer to convince the consumer to replace his or her existing product. Digitization has the potential to de-emphasize this latter dimension of competition in favor of firms providing incremental quality updates to a product, which ensures a continued stream of revenue, while also reducing the chance that a consumer would be exposed to the firm's competitors' products.

In my job market paper, I study how smartphone app developers' abilities to employ use monetization and post-purchase updating affects the frequency and content of product updates. To do so, I construct and estimate a dynamic model of product updating, where developers choose whether and how to update their apps. I then conduct a series of counterfactual simulations to understand how restricting app developers' ability to employ use monetization and update their products affects the rate at which they innovate and update their apps. In order to estimate my model, I employ natural language processing and machine learning techniques to classify updates and to define markets. The method I develop for defining product markets should be of value to other researchers studying competition in digital marketplaces, as it allows for the identification of precise, categorical product markets given high-dimensional text product descriptions, which are often available through online markets.

After conducting my counterfactual simulations, I find that the introduction of use monetization and post-purchase updating via digitization leads to an increase of 60% to 140% in the frequency of product updates. Additionally, digitization results in an increase in the relative frequency of major, feature-adding updates relative to more minor, incremental updates. Future work on this industry will investigate how firms choose monetization strategies as well as how and why the adoption of monetization strategies differs across markets. My results will be relevant to both the growing app industry, but also more generally as they will provide a context for studying how digitization will affect other durable good industries.

In addition to my dissertation work, I am continuing work on a number of other projects related to the economics of digitization. In one project, written with Federico Ciliberto (UVa) and Gaurab Aryal (UVa) and titled "Public Communication and Tacit Collusion in the Airline Industry," we digitize transcripts of airlines' quarterly earnings calls to study how top airline executives have used public communications in order to coordinate on capacity decisions. We find evidence that when all legacy carriers in a market communicate using certain keywords about artificially reducing the number of seats, it leads to a substantial reduction in the number of seats. We then develop a falsification test that employs a linguistic neural network model to determine whether the keywords we identify are the ones driving the coordinating behavior.

Attending the graduate tutorial and meeting of the NBER project on the Economics of Digitization for the last three years has been very helpful for both my research and my development as an economist. I expect the same will be true for the 2018 meeting. I appreciate your consideration for this tutorial.