NBER Productivity, Innovation and Entrepreneurship Program
The Digitization Grant Research Proposal

The Impact of Software Piracy on Innovation

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The growing trend towards digitization and the proliferation of digital software has been paralleled by the growth of digital piracy, the unauthorized copying, and distribution of digital goods. This phenomenon has generated considerable attention because of the potential economic consequences of piracy. That said, there has been little empirical inquiry into how piracy may influence innovation. On the one hand, the pervasive argument for why piracy is so damaging economically, is that it may diminish returns to investing in software development and in turn the development of new products (Danaher et al., 2014). This is often the narrative put forth by media companies and software developers for why legislators need to regulate piracy (SIIA, 2018). Yet, on the other hand, since piracy may limit the monopoly power of the software creator over a particular title (Belleflamme and Peitz, 2008), piracy may lead software developers to invest in new product development, much in the same way that the threat of competition may force monopolists to invest in product development. It is unclear whether, in aggregate, piracy leads to increased or lowered innovation, and whether there is heterogeneity in this effect across different developer populations.

The proposed research will look at the piracy within the context of mobile apps, and evaluate how piracy is influencing innovation within this context. The fundamental empirical challenge in studying the impact of piracy on innovation, is that piracy is not independent of product or firm characteristics. For instance, we may expect that the most popular titles are those that are the most likely to be pirated. The proposed project will exploit a hacking attack that occurred on the jailbreak platform (an unofficial storefront for iOs Apps), where all of the titles on the platform were simultaneously pirated (overnight) and released for free. This will allow us to make inferences about the overall impact of piracy on subsequent innovative activities by developers, such as new product releases, pricing strategies, or updates. This setting also provides us with a number of potential control

groups, including free products that were not affected by piracy, previously hacked products and products from other platforms (the Apple App Store and Android Marketplace).

Additionally, we have data on the full population of developers and products, along with detailed information about product and developer characteristics, such as information about product ratings, product downloads, prices, and dates of product release. This detailed data along with the scale of the hacking attack, allows us to estimate heterogeneous treatment effects to examine how the treatment effect varies across different product and developer characteristics. Therefore, we expect that our analysis will center around a difference-in-differences analysis, with an additional exploration of heterogeneous treatment effects to understand how different sub-populations within the data react to the hacking shock.

The insights from this project will help to inform our understanding about the overall impact of piracy on innovation, which is something often talked about, but not empirically explored. Perhaps the most important result will be providing evidence of the sub-populations where piracy has the most profound effects on innovative outputs. In addition, we plan to provide important descriptive results about the overall incidence of piracy within this context, and insights into which product characteristics are associated with piracy in this setting. This would be the first study documenting these facts within the context of mobile app marketplaces, an increasingly important outlet for software development.

References

Belleflamme, P., Peitz, M. (2012). Digital Piracy: Theory. *Oxford Handbook of the Digital Economy.* Ed. Martin Peitz and Joel Waldfogel, Oxford Handbooks.

Danaher, B., Smith, M. D., & Telang, R. (2014). Piracy and copyright enforcement mechanisms. *Innovation Policy and the Economy*, 14(1), 25-61.

SIAA (2018). Consequences of Software Piracy. [Software & Information Industry Association Website Introduction] Retrieved from https://www.siia.net/Divisions/IP-Protection-Services/About/Consequences-of-Software-Piracy

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Academic Experience

2016 Assistant Professor Data Sciences & Operations
University of Southern California, Marshall School of Business,
Los Angeles, CA.

Education

2010 – 2015 Doctor of Business Administration
Copenhagen Business School, Department of Innovation & Organizational Economics, Frederiksberg, Denmark.
Thesis Topic: Essays on Competition, Innovation and Firm Strategy in Digital Markets

2014 – 2015 Visiting PhD Student
London Business School, Strategy and Entrepreneurship Department, London, UK.

2013 – 2014 Visiting PhD Student
Bocconi University, Department of Management & Technology, Milan, Italy.

2008 – 2009 Master of Business Administration
Ryerson University, Toronto, Canada.

2004 – 2008 Bachelor of Mechanical Engineering
Dual Specialization: Mechatronics & Management Science.
Ryerson University, Toronto, Canada.

Research Overview

My research tries to understand basic questions about innovation and appropriability in digital industries. My work is largely empirical often involving large-scale panel datasets.

RESEARCH PROJECTS

- How do Signaling Motives Influence the Rate and Direction of Innovative Activity? A Study of Competition and Innovation in Digital Industries. Under Review at *Information Systems Research.*

- Freemium, Network Effects and Digital Competition: Evidence from the Introduction of Game Center on the Apple AppStore ***(with Kevin Boudreau & Lars Bo Jeppesen)***. In preparation for submission to *Information Systems Research*.

- Digital "Mash-ups," Patents, and Copyright: Evidence from the Apple App Store ***(with Kevin Boudreau & Lars Bo Jeppesen)***. In preparation for submission to *Review of Economic Studies.*

- Profiting from Their Digital Assets: Appropriability Strategies on the Apple App Store ***(with Kevin Boudreau & Lars Bo Jeppesen)***. Under Review at *Research Policy.*

- Persistence of Market Leadership in Digital Industries ***(with Kevin Boudreau & Lars Bo Jeppesen)***. Under Review at *Strategic Management Journal.*

- *Strategic Acquisition by Platform Companies* ***(with Omar El Sawy and Margherita Pagani)****. Under Review at Strategic Management Journal.*

AWARDS & GRANTS

- Kaffuman Prize Nominee for Best Student Paper Award REER Meetings 2015
- iOrb (Institute for Outlier Research in Business) Grants 2017 - $10,000.
- iOrb (Institute for Outlier Research in Business) Grants 2018 - $25,000.
- National Center for the Middle Market Fellowship / Grant - $30,000.

PERSONAL INFORMATION

Nationality: Canadian.

Place & Date of Birth: Kragujevac, Serbia – December 13, 1986.