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Digitization Tutorial

About Me

I am a third-year Ph.D. student from Dyson School of Applied Economics and Management at Cornell University. My research interests are in technology innovation, digitization, and social media. My committee chair is Dr. Aija Leiponen. My committee members are Dr. Chris Forman and Dr. Ben Leyden. I am glad to apply for this tutorial on the Economics of Digitization, generously held by the National Bureau of Economic Research.

Research project

My current project aims to examine the impact of patent litigation on invention activities in the market. I construct a novel database based on raw data from Stanford NPE Litigation database and use a difference-in-difference approach to answer this question. Specifically, I treat the invention activities within a specific technology class as a market. I view litigation behavior as one channel of competition between companies. Initially, there was only litigation shock to the invention market from product companies. When patent trolls started to litigate, a new form of competition emerged and the litigation shock to the invention markets can come either from patent trolls, product companies or both. I use a difference-in-difference method to examine whether the litigation behavior of patent trolls and product companies positively or negatively impact invention activities in the market and whether patent trolls harm invention activities in the market more compared to what product companies have done. I find that when both patent trolls (one type of non-practicing entities that are considered toxic by policy-makers and decision-makers in large companies) and product companies (practicing entities) litigate under the same technology field, the invention activities within the field in the consequent year will decrease. Patent trolls induce more harm to the invention activities compared the product companies. Quantitatively, litigation behaviors in more recent years induce larger harm to invention activities.

Continuing from my current project, I would like to examine how, after experiencing patent litigation shock, companies would adjust their language in the financial documents to reveal the change in firm performance due to litigation shock. Financial documents usually serve as an important source for shareholders to form expectations for their investment in the next period. However, as examined in earlier studies such as Cohen et al. (2018)[1] and Brown and Tucker (2011)[2], shareholders are not sensitive enough to the change in wordings and information, leading to a lagged effect on the stock market performance. Therefore, this project would also aim to examine how shareholders react to the change in firm performance by litigation shock, whether they become more and more sensitive to the change of language in the financial documents, and whether their attention to the information in the financial documents changes. More specifically, I would like to look into the impact of patent litigation on the change of wording and tone in financial documents and whether the change in language regarding litigation has impact on stock prices. I would like to focus on firms from specific sectors that have high competition between firms and the threat of litigation, such as the technology sector. I am also interested in examining whether there is a heterogeneous treatment effect of litigation (from patent trolls vs product companies) towards change in financial documents and stock market reaction

[1] Lauren Cohen, Christopher Malloy, and Quoc Nguyen. *Lazy Prices*. Working Paper 25084. National Bureau of Economic Research, Sept. 2018. DOI: 10.3386/w25084. URL: http://www.nber.org/papers/w25084.

[2] Stephen V Brown and Jennifer Wu Tucker. "Large-sample evidence on firms' year-over-year MD&A modifications". In: *Journal of Accounting Research* 49.2 (2011), pp. 309–346.

in this upcoming project.

Another project I am currently planning to work on is related to the role of online mass communication in digital marketing strategies. Inspired by Conover et al. (2011)[3] and Barberá et al. (2015)[4], I would like to examine how online mass communication impacts digital marketing strategies. More specifically, I would like to work on how the observed reaction of public to big (ongoing) international events such as political news (i.e., trade war between US/China, tension between China and Korea/Japan) and brand scandals related to sensitive political issues (i.e., identifying HK as a different country) influence the digital marketing strategies of international brands in China. I would like to focus on the marketing strategies of large technology companies, especially before the launch of new products. In this project, I would like to study how human and social bots work as part of the marketing strategies. There are studies[5][6] about how the network of social bots work online and how bots massively spread true and false rumors. I am curious about how bots can potentially become powerful as a digital marketing tool, given bots' capability of knowledge diffusion online.

Dissertation goal

I have not yet started to write the dissertation and therefore do not have a dissertation title now. However, my dissertation will be around identifying how firms in technology sectors react to various events such as patent litigation and political tensions. In the end, I would like to show causal relationships between these events and firm strategy and performance of large companies in the technology sector. I would also like to offer suggestions to decision-makers in these large companies on how to deal with these events.

[3] Michael D Conover et al. "Political polarization on twitter". In: *Fifth international AAAI conference on weblogs and social media*. 2011.

[4] Pablo Barberá et al. "Tweeting from left to right: Is online political communication more than an echo chamber?" In: *Psychological science* 26.10 (2015), pp. 1531–1542.

[5] Emilio Ferrara et al. "The rise of social bots". In: *Communications of the ACM* 59.7 (2016), pp. 96–104.

[6] Soroush Vosoughi, Deb Roy, and Sinan Aral. "The spread of true and false news online". In: *Science* 359.6380 (2018), pp. 1146–1151.