Digitization Tutorial

Nan Clement

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1 Contact Information

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2 Program

2019 till now (expecting 2024)
PhD Candidate, University of Texas at Dallas
Economic Department

3 field of study

Major Field: Health Economics (Healthcare Information Technology)
Minor Field: Economics of Privacy

4 Interest in the Economics of Digitization

I want to attend this tutorial mainly because I am from a small department and do not get chances to discuss digitization in seminars with colleagues.

I had the honor of being an attendee for the fall 2022 privacy tutorial. It was a life-changing experience. I want to enjoy the great joy of gaining feedback on my projects and making new friends in this spring tutorial, and I look forward to seeing Catherine's brilliant speech in person and meeting old friends again. I should remember to ask Avi to sign my copy of his books this time. It will also be exciting to attend the March 3, 2023, meeting of the NBER's Economics of Digitization project for the first time.

I understand that I need to cover travel, and I have some resources from my department and the UT Office of Graduate Education for the trip.

4.1 Dissertation

Essays on Digital Economics

Project 1: "Dynamics of Shared Security in the Cloud" (Co-author with Daniel G. Arce)

Abstract: Cloud services exist under a shared security environment; both cloud services providers (CSPs) and users contribute to overall security. We investigate the nature of shared security in a dynamic game where users' security contributions and cloud usage figure into their CSP's vulnerability. Furthermore, CSPs' own security contributions take their users into account as well as competition with other CSPs. We characterize the Markov Perfect Equilibrium time path of security in the cloud. In particular, we identify a novel form of time-path strategic complementary between usage and a CSP's Markov state of security. This implies that cloud security is an unusual form of impure public good whereby individual contributions bolstering a CSP's security endow a selective incentive (benefit) on others, rather than providing a selective benefit to the contributor themselves. Consequently, CSP vulnerability increases over time. (Submitted & Under Review)

Project 2: "Economic Motivations of Cyber Attacks in Health Industry: An Empirical Work"

Abstract: In 2022, healthcare data breaches have impacted more than 40 million victims, with their privacy rights violated. The data breaches have cost nearly 600 US hospitals multi-million dollars for ransom, lawsuits, and incident response and recovery. Data breaches also can be life-threatening event. More importantly, data breaches increase mortality rate and reduce healthcare quality in the long term. I test whether hospital consolidations are an important reason for data breaches using 2007-2022 Levin Associate's M&A data and the Office of Civil Rights' archived healthcare breach reporting data. Data breaches break out 4.68 percentage points more often within one year before or after the closing of a M&A deal. The stacked difference-in-differences strategy holds hospitals and health systems that experience M&A deals two years in the future as controls for parallel trends assumption. Fewer data breaches occur when the deal is on a bigger target hospital or a public target hospital. When the acquirers are public companies, or the target hospitals have a bigger revenue or EBITDA, they are more dangerous. During M&A, data breaches can happen for three reasons. Firstly, when the buyer and seller negotiate and execute the deal on the target hospital, the internal management and risk control quality could be lower to where data breaches through human error may occur. Human error could be one of the following: loss, theft, or improper data disposal. Secondly, the M&A news reporting signals information about the target hospital, the seller, and the buyer. The malicious actors interested in the healthcare industry adjust their strategic targeting and efforts according to the additional information. Lastly, after the deal is closed, the technical incompatibility of the two Electronic Medical Records (EMR) systems generate vulnerabilities for malicious actors to exploit. Data breaches due to the EMR differences increased by 4.8 percentage points during the M&A process. I identify the technical incompatibility channel

by removing human error and pre-closing data breaches. The remaining data identifies the pre-closing signaling channel. The signaling channel accounts for an increase of 2.67 percentage points in data breaches during M&A. However, M&A has a negative impact on data breaches due to human error, especially after 2020. My findings point to M&A as a fundamental reason for the rise in healthcare data breaches. The vast information released about the deal signals the potential financial benefit for the malicious actors to exploit, especially when the buyer is a public company or the target hospital is profitable. Policies should encourage cybersecurity incident prevention warnings based on the hospital and health system size and market visibility. Lastly, post-merger information system risk control deserves more management and policy attention, especially when the buyer is a public company. (Job Market Paper, Work-in-Progress)

4.2 Committee Members

Dr. Daniel G. Arce and Dr. Anne Burton

4.3 Conferences and Presentations

Economic Brownbag Presentation, School of Economics, Political and Policy Sciences at UT Dallas, Richardson, TX, April 2022

The 21st Annual Workshop on the Economics of Information Security (WEIS), Rump Session, Tulsa, OK, June 2022

AEA-CSWEP Successfully Navigating Your PhD mentoring workshop for 3rd Year + Women Non-Binary PhD Students in Economics Economics-Adjacent Fields, invited mentee, Zoom, September 2022

The 1st University of North Texas Cybersecurity Symposium, October 2022

NBER 2022 Fall Economics of Privacy Tutorial, invited atendee, Cambridge, Massachusetts, October 2022

AEA-CSWEP Successfully Navigating Your Economics PhD workshop. The workshop is for 3rd and 4th year women and non-binary PhD students in Economics and related fields at SEA 92nd Annual Meeting, invited mentee, Fort Lauderdale, FL, November 2022

SEA 92nd Annual Meeting, Games and Dynamics Session, Fort Lauderdale, FL, November 2022