Application for NBER winter digitization tutorial 2018

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Course of Study:

I am a 4th year PhD student in Information Technology at MIT Sloan School of Management. My area of study is the economics of digitization and I am advised by Erik Brynjolfsson.

Selected Coursework:

- PhD Microeconomics sequence
- PhD Econometrics sequence
- Applied Econometrics (Joshua Angrist)
- Economics of IT (Erik Brynjolfsson)
- Economics of innovation (Scott Stern)
- Industrial Organization (Glen Ellison)

Research:

In my dissertation (expected graduation in Summer 2020), I am exploring new ways of measuring welfare in the current digital economy. I have currently 3 working papers related to this topic (see abstracts below):

1. Using Massive Online Choice Experiments to Measure Changes in Well-being (with Erik Brynjolfsson, Felix Eggers)

GDP and metrics derived from it, like productivity, have been central to our understanding of economic progress and well-being. In principle, changes in consumer surplus (compensating expenditure) provide a superior, and more direct, measure of changes in consumer well-being, especially for digital goods. In practice, consumer surplus has been difficult to measure. We explore the potential of online Single Binary Discrete Choice (SBDC) experiments that seek to measure consumers' willingness to accept compensation for losing access to various digital goods and thereby estimate the changes in consumer surplus from these goods. We test the robustness of the approach and benchmark it against established methods, including a comparison of hypothetical choice and incentive compatible choice that require participants to give up Facebook for a period of time in exchange for compensation. The proposed choice experiments show convergent validity and are massively scalable. Our results indicate that digital goods have created enormous gains in well-being which are largely missed by conventional measures of GDP and

productivity. By periodically querying a large, representative sample of goods and services, including those which are not priced in existing markets, changes in consumer surplus and other new measures of well-being derived from these online choice experiments have the potential for providing cost-effective supplements to existing national income and product accounts.

- This research has been featured in the economist (Ref. The "free" economy comes at a cost, but economists struggle to work out how much https://www.economist.com/news/finance-and-economics/21727073-economists-struggle-work-out-how-much-free-economy-comes-cost)
- I have presented this research at the Workshop on Information Systems and Economics 2016 (where it won the best student paper award), NBER Productivity lunch, ZEW Conference on economics of ICT and will present it at the AEA annual meetings in January 2018 (a shorter version of this research has been accepted for publication in AEA Papers & Proceedings, forthcoming in May 2018).
- I have been invited by the Bureau of Economic Analysis to present this research in April 2018.

2. The Digital Economy, GDP and Consumer Welfare (with Erik Brynjolfsson, Erwin Diewert, Felix Eggers and Kevin Fox)

There are significant recent concerns regarding whether or not the benefits of the Digital Economy are being appropriately measured. A feature of the Digital Economy is the proliferation of new and "free" goods and services. We derive explicit terms for the contributions of a new and free goods (or services) to welfare change. We also derive a lower bound on the currently unmeasured marginal additions to real GDP growth that arise from new and free goods, giving a means by which the underestimation of GDP growth can be quantified. We apply this framework to several empirical examples of free digital goods by estimating their valuation through incentive compatible discrete choice experiments and quantify the adjustment terms to real GDP growth to account for these goods.

3. Hypothetical Bias in Choice Experiments (with Erik Brynjolfsson, Felix Eggers)

It is a consistent finding in stated preference research that hypothetical questions differ systematically from questions that are consequential, i.e., incentivized. Typically, we see that hypothetical questions about willingness-to-pay are overstated compared to incentivized questions, while willingness-to-accept is understated. Although most stated preference surveys are conducted in a hypothetical setting, and are therefore biased, not much is know about the magnitude of the bias and what influences it. We propose a theory that suggests that the magnitude of the hypothetical bias in choice experiments follows a nonlinear trend. To test the theory and estimate the magnitude of the bias we conduct a meta analysis of previous choice experiments that compare hypothetical and incentivized conditions and conduct own experiments across different product categories. In order to identify drivers of the hypothetical bias we systematically vary

factors that we identified from the literature and qualitative pretest including loss aversion, System 1/System 2 judgments, strategic responses, and option value.

In addition to these papers, I have several ongoing projects (see below for brief descriptions):

- Technological innovations, market value, productivity and consumer surplus (with Erik Brynjolfsson)
    - How much of the total surplus created by digital technologies is captured by producers and how much of it goes to consumers (appropriability ratio)? What is the correlation between consumer surplus created by various technologies and their market valuations, contributions to productivity and innovation related metrics?
- Measuring the economic value created by Wikipedia to users and editors (with Jana Gallus)
    - Wikipedia is a truly free good (no ads), produced entirely by volunteers. How much is the total consumer surplus created by Wikipedia for readers reading articles? How much value do editors get by editing Wikipedia and why do they value editing Wikipedia? We are collaborating with the Wikimedia foundation to run incentivized choice experiments on Wikipedia to answer these questions.
- Measuring the consumer surplus created by network effects (with Seth Benzell)
    - In this project, we propose a new scalable approach to measure network effects on any platform. We illustrate this approach using the example of Facebook where we run large scale incentivized choice experiments to estimate network effect demand curves.
- Algorithmic Bias in Online Advertising: The Case of For-Profit College Ads (with Avi Goldfarb, Catherine Tucker)
    - We show that algorithmic advertising can lead to different types of higher education ads shown in poorer and richer areas due to the algorithm optimizing for clicks. The algorithm starts out neutral, learns higher click through rates of for-profit college ads in poorer areas, and starts showing more and more of these ads in those areas.
- Demonetization and cryptocurrency adoption (with Christian Catalini)
    - In this project we explore the adoption of bitcoin following an exogenous demonetization shock in India.

References:

Erik Brynjolfsson, MIT

Catherine Tucker, MIT

Jana Gallus, UCLA