

I am working on a book on the political economy of the Fourth Industrial Revolution—it is entitled “The Twilight of the Third Industrial Revolution and the Dawn of the Fourth.” Data is today's most valuable economic input in an economy powered by intangible capital and rife with applications such as digital platforms, new markets around the Gig Economy, interconnected appliances, smart factories and driverless cars, and virtual reality.

**The primary question my book explores is: what caused all this?**

My answer is superstar firms that took the initiative within their sectors and helped develop and spread amazing innovations in a bid to create entire new industries from scratch. To do so, they developed a host of institutions and practices, including industry trade shows and publications and licensing agreements that widely diffused several standardized general-purpose technologies. I argue that patents were key to codifying, disclosing, and spreading these technologies.

Taken together, these superstar firm led processes represented the fertile soils that gave birth to vast, rich digital ecosystems. Moore's Law, with the doubling of computing power every two years by fitting twice as many transistors on the same chip, is probably the most famous example: leading firms such as Fairchild Semiconductor, Texas Instruments, Intel, Motorola, Apple, and Qualcomm kept pushing the frontier forward from the transistor to the integrated circuit to the microprocessor to the personal computer to the internet to the smartphone. And they took their rivals and firms up and down the supply chain along for the ride by sharing information and knowhow with them since together they were creating entire new industries from whole cloth. Cooperation was therefore just as important as competition.

I also look at the effects the Fourth Revolution had on productivity and profits, and find that, contrary to conventional wisdom, innovation since the late 1970s has supercharged productivity in high-tech sectors while

reducing profit margins in those industries due to pervasive technological diffusion. These sectors have also introduced groundbreaking process and product innovations and catalyzed a steep reduction in the quality adjusted prices of semiconductors and electronic digital devices. This promises to unleash unbelievable prosperity and opportunity, which explains why the market capitalization of the top five publicly traded firms, all in high tech, is over \$10 trillion dollars and the top 100 firms are over 95% in these sectors. We are about to enter an amazing era with AI at our fingertips where everything is going to change, and make the Space Age look quaint and small, we just don't know it yet.

I have completed three empirical chapters based on quantitative analyses of patent data, firm level data, and sectoral level data. These chapters are dedicated to testing 20 empirical implications deduced by my theoretical framework. They are centered on hypotheses about technological diffusion in the semiconductor industry as well as computer hardware, software, telecommunications and other innovative sectors between 1976 and 2006.

This summer, I will turn to completing additional chapters on other drivers of the so-called internet 2.0 since the introduction of the iPhone in 2007: AI, Cloud Computing and the Internet of Things. I will seek to explain this phenomenon as a byproduct of not only the technological diffusion processes I have already explored in my three completed chapters, but as a function of key reforms to intellectual property rights, such as the introduction of the Court of Appeals of the Federal Circuit in 1982, key reforms to antitrust policy that ushered in the Consumer Welfare Approach to mergers and so-called unilateral conduct around monopolization, and key reforms to telecommunications policy, such as the advent of Section 230 of the 1996 Community Decency Act.

I am currently collecting evidence, both qualitative and quantitative, that these key changes helped commercialize the innovations around the Fourth Industrial Revolution, including by complementing the technology diffusion processes I have already outlined in my extant chapters.