Application for NBER Digital Economics and AI Tutorial

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Graduate Study and Program Status

I am a fourth-year Ph.D. candidate in the Management and Organization Department at USC Marshall School of Business, specializing in strategic management. I entered the program in Fall 2022 and have completed all required coursework. I am planning to be on the 2026–2027 academic job market.

Research Interests

My research examines how government innovation policies and regulations shape firms' strategic innovation behavior in emerging technologies and their strategies for acquiring knowledge workers.

Dissertation: Firm Strategic Innovation Under Regulatory Policy Changes

Technology development is rarely driven solely by objective assessments of merit. Power dynamics and institutional forces heavily influence which innovations are pursued and who benefits from them. In many countries, governments have identified AI as a strategic priority and are actively trying to foster technological development while simultaneously intervening to regulate potential risks. Yet, despite extensive use of innovation policies and regulations, empirical evidence offers mixed conclusions about how these interventions affect innovation in targeted fields. In this context, my dissertation comprises three empirical studies that examine how government innovation policies and regulations shape the trajectory of innovation in emerging technologies, especially focusing on artificial intelligence (AI), beyond the sheer quantity of patents. I investigate how policies influence who innovates, which technologies are prioritized, and the quality of innovative output in AI.

Chapter 1: Substitution Over Compliance? Strategic Innovation between Data Privacy and Security Under Regulatory Scrutiny

The study examines how regulatory scrutiny shapes not just the quantity but the strategic direction of firm innovation. While existing literature has extensively focused on whether regulations suppress or promote innovation, I focus on a critical gap: firms don't merely decide whether to innovate, but strategically determine which technologies to prioritize. I argue that when facing regulatory scrutiny, firms leverage information asymmetry between the legislators and themselves to strategically innovate technologies that align more closely with their private interests rather than public concerns. This behavior is particularly pronounced when regulators lack comprehensive understanding of the technologies they aim to regulate, allowing firms to steer innovation in directions that favor their interests over the public good.

Using the Facebook's privacy policy change with the introduction of Open Graph API in 2010 as a quasi-natural experiment that heightens legislators' concerns on data protection, this paper employs a generalized difference-in-differences approach to analyze how firms sensitive to congressional hearings on data protection adjusted their innovation strategies compared to their less sensitive counterparts. I construct a novel dataset that integrates 350 data protection-related congressional hearings (from 29,122 total hearings between 1998-2021), 10-K filings from 523 S&P 500 firms, and 995,846 patents (including 78,490 data protection patents) to analyze innovation patterns in two distinct domains: data privacy (benefiting consumers) and data security (benefiting

firms). I utilize advanced large language models and other natural language process techniques to overcome challenges of processing unstructured text data, enabling precise classification of nuanced patents and the link of firm to the congressional concerns.

The findings reveal that following the scandal, treated firms increased data protection patent share by 4.1-4.3 p.p. compared to the control group. However, the increase in data privacy patents (1 p.p.) was only one-third that of data security patents (3 p.p.)—despite "privacy" being mentioned 1.239 times more frequently than "security" in congressional hearings. Notably, when committee members with technical expertise participated in hearings, firms significantly increased their data privacy innovation with no corresponding rise in data security patents. I also find that the increase in patent quantity came at the expense of quality, with treated firms relocate their inventive efforts away from a few breakthrough patents and toward the less impactful ones. This study contributes to literature on regulatory response strategies, early-stage policy engagement, symbolic organizational conformity, and demonstrates how firms strategically navigate regulatory uncertainties while influencing innovation trajectories in emerging technologies.

Chapter 2: Government Policy and Innovation Outcomes: Evidence from 2006 Chinese Indigenous Innovation Policy on Automation-AI Technologies

The study investigates how government initiatives to foster domestic innovation shape research productivity in emerging strategic technologies. While governments worldwide increasingly deploy policies to stimulate domestic innovation capacity, evidence regarding their effectiveness remains mixed. Some studies document positive impacts of R&D tax credits and immigration policies, while others find only modest effects. This study addresses a critical gap in our understanding: how national innovation policies differentially impact diverse institutional actors, particularly in countries with significant government market influence like China. I examine how China's first full-fledged nationwide innovation policy—the 2006 Medium and Long-term Plan for Development of Science and Technology—influenced automation-AI innovation across different types of organizations, regions, and institutional capabilities.

I construct a comprehensive dataset of over 1.4 million utility patents granted by China's National Intellectual Property Administration (CNIPA) to 387,000 unique assignees between 1999-2015. Using supervised machine learning methods with 3,200 hand-coded patents as training data, I classify approximately 15% of patents as automation-AI related, addressing limitations of traditional keyword-based approaches in capturing evolving technologies. I employ a two-way fixed effects model to analyze how the initiative affected both the quantity (share of automation-AI patents among total patents) and quality (forward citations) of innovation outputs, comparing universities—which operate under stronger political pressure through central appointment of leaders and government funding dependence—with firms that face relatively greater market discipline.

The findings reveal that the initiative significantly increased universities' share of automation-AI patents by 4.7 percentage points (64.4% increase from sample mean) compared to firms, but had a minor negative effect on patent quality (13.61% reduction in citations). Subsample analyses demonstrate stronger effects in economically less-developed regions, suggesting political pressure from local governments as a key driver rather than knowledge spillovers. Moreover, universities with higher pre-initiative patenting activity showed the greatest quantity increases but significant quality declines, while the least active universities experienced no quantity change but substantial quality improvements. Additionally, I found these results are driven by political incentives using (1) degree of government control measured by geographical proximity between the entity and the prefectural level local government, and (2) political connection between the provincial-level and prefectural-level leader to proxy the need for demonstrating loyalty through policy alignment. These results

contribute to reconciling competing perspectives on government innovation policy—supporting both the "helping hand" view in stimulating quantity and the "distorting hand" perspective in potentially sacrificing quality. This study advances understanding of political influences on research direction and provides methodological contributions through novel machine learning approaches to identify AI technologies in patents beyond conventional keyword-based methods.

Chapter 3. Immigration Policy and the Selection of Risky Talent

U.S. innovation increasingly depends on immigrant inventors, yet it is unclear whether immigration policy leads high-ability foreign inventors to be inefficiently concentrated in academia—gateway into the U.S.—rather than fully deployed in better matched firms, and what happens when this constraint is relaxed. This paper examines how the 2008 STEM Optional Practical Training (OPT) extension reshaped firms' hiring and utilization of foreign knowledge workers. Prior to the policy change, sponsoring foreign PhDs for long-term visas required large, partly irreversible investments, leading risk-averse firms to "cream-skim" safe candidates from elite universities and closely matched fields, while universities served as safe harbors for high-ability but noisy or unconventional talent. The STEM OPT extension lengthened the period during which foreign STEM graduates could work in the United States without sponsorship, effectively creating a low-commitment trial period before firms decide whether to sponsor. Exploiting quasi-experimental variation from the OPT extension, I study whether the policy reallocated foreign STEM PhDs from universities to firms, broadened access to incumbent employers for graduates from non-elite institutions and off-field backgrounds, and altered the composition of talent entering firms along prestige and skill-distance dimensions. Linking early-career employment to wage and patent outcomes, I further explore whether firms use the extended trial period to screen and retain a subset of high-performing foreign workers and to shift their innovation portfolios toward more exploratory, high-variance projects.

Additional Research Projects on Artificial Intelligence

How AI Shapes Non-AI Positions: Evidence from Professional Service Firms

Artificial intelligence (AI) technologies have been widely applied to tasks traditionally requiring human cognitive skills ("cognitive tasks"), yet their use in tasks requiring human social skills ("social tasks")—particularly those involving relationship building—remains limited. We argue, however, that AI's growing role in cognitive tasks reshapes organizational expectations of workers performing social tasks. We examine professional service firms (PSFs), which solve complex client problems by coordinating back-end functions focused on knowledge production with front-end functions centered on client interaction and relationship management. We argue that when PSFs increase AI use in back-end functions, the resulting gains in knowledge quality and speed increase the demands placed on front-end workers. Specifically, increased AI use in back-end functions shapes front-end positions in three key ways: (1) it requires greater time commitment, (2) it raises the level of human capital needed, and (3) it expands the number of front-end positions. To test these arguments, we analyze U.S. job postings from PSFs from 2010 through 2022, distinguishing between AI-related and non-AI-related positions as well as between back-end and front-end positions. We further leverage the 2015 launch of TensorFlow as a plausibly exogenous shock to the availability of AI applications in PSFs. Our findings strongly support our theoretical arguments. More broadly, this study suggests that through task interdependence and organizational design, increased AI use can reshape social tasks that currently make limited direct use of AI but rely heavily on AI-generated information.

Dissertation Committee

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