

Creative Destruction in Organizational Capital: Evidence from the Online Platform Economy in Japan and the United States

Kazufumi Yamana

(Kanagawa University, Japan)

Wendy Li¹

(Bureau of Economic Analysis, United States)

Makoyo Nirei

(University of Tokyo, Japan)

Because of improved programming capabilities and the rapid price decline of information technology hardware, new business models have arisen and many of them embodied into different types of online platforms. For example, online sharing platforms, such as Uber and Airbnb, increase the efficiency of underutilized assets and lower the consumption prices of the services. Online retail platforms, such as Amazon Marketplace, have greatly reduced transaction costs for many small and medium sized enterprises to sell products across states and across borders. Online platforms, mostly created and run by young companies, are asset-light but have grown fast and deeply disrupted many industries. A prominent example is Airbnb, a company that has only 600 employees but the number of its listed properties has surpassed that of the world's largest hotel chain. Moreover, according to the European Commission (2015), between 2001 and 2011, online platforms accounted for 55% of U.S. GDP growth and 30% of GDP growth in the European Union.

In this paper, we develop a model where, in a service industry, a firm uses two types of inputs, labor and organizational capital to produce outputs. In this model, we examine how the introduction of an online platform affects a firm's value, investment behavior in organizational capital, and performance. The key hypothesis is that: when an online platform is introduced in the industry, non-platform participating incumbents cannot adjust their operational size and employment level in the short run, causing the depreciation of the incumbent's organizational capital. That is, the existing non-platform participating incumbent will see its organizational capital depreciate faster, which reduces its stock of organizational capital, and hence, its stock price. Based on sources from Compustat, Nikkei Financial Quest, NYSE, NASDAQ, and the

¹ The views expressed are those of the author and do not necessarily reflect those of the U.S. Bureau of Economic Analysis.

Tokyo Stock Exchange, the initial data cover the hotel and transportation industries in both Japan and the U.S. for the period of 2002 to 2017.

Several preliminary findings are as follows: First, we measure the intangible assets of online platform participating companies and their non-participating counterparts in both Japanese and U.S. hotel and transportation industries. Second, platform participating firms have a higher degree of organizational capital intensity and accumulate a higher stock of organizational capital. Third, the creative destruction of the online platform technology has been shown in the comparison of the estimated depreciation rates of organizational capital between the two groups. In general, the higher depreciation rate of organizational capital for existing non-platform participating incumbents implies that the value of their organizational capital is declining faster. Fourth, by using a machine learning technique on a sample of 42,573 daily stock price observations, we show that the shock of the online platform technology caused a negative impact on the stock prices of existing non-platform participating incumbents but a positive impact on their platform participating counterparts. Moreover, we find that when there is a new online platform technology shock, while we will not observe an immediate impact on output or employment, rather than total factor productivity, the effect of the introduction of the new technology operates through the depreciation of organizational capital. As a result, we will observe an immediate effect in a firm's value and investment rate. This important finding supports Brynjolfsson et al.'s (2017) conclusion that there is a significant lag between the rapid advances in technologies due to the rise of new general purpose technologies and their impacts on an economy's productivity growth. Lastly, based on our ridesharing service study, we propose a new way to indirectly measure the welfare impacts of online platforms.