

Siwei Cao's Research Statement

My general interest in economics is to understand the impact of technology progress on economic performance. More specifically, I focus on understanding the efficiency of patent regime under technology progress, evaluating the impact of knowledge spillovers on R&D investment, examining firms' strategies of managing their intellectual properties and investigating the role of patent as a litigation tool. In this statement, I briefly describe two working papers and three other research projects underway.

My job market paper examines firms' patenting strategies when technology develops at different speeds. My general finding is that when technology develops faster compared to before, firms are more willing to secure early patent grants for their innovations. In order to directly measure firms' concerns for patent pendency, I utilize a policy design provided by the Chinese patent office, which provides two types of patent protection that differentiate mainly in terms of patent pendency. This paper complements the existing literature on the optimal design of patent system. It also introduces a novel perspective for using patent renewal decisions as a measure of private return to patent.

My other working paper, which is written with two other co-authors and is close to submission, explores patentee behaviors regarding equivalent inventions in different patent systems. We overlay the Chinese patent dataset with the US patent dataset and match all the Chinese and the US patents that describe identical inventions. We are able to observe patenters' expectation of patent pendency (by their choices between Chinese invention patents and Chinese utility models) and their realization of the US patent pendency. We find the US patent system is very ineffective in addressing patenters' concerns for speed of patent protection during the period 1993-2008. This study provides empirical evidence that a uniform patent regime might be inefficient in providing R&D incentives.

In addition to these working papers, I have several other research projects underway. In one project, I examine the effect of patent grant on technology partnership (e.g. arm-length licensing and arm-length patent transfers). The dataset I use consists of Chinese inventions that are sought for patent protections both in China and the United States. The US patents protecting these inventions are, later on, either arm-length licensed or transferred to US firms. Since the two patent offices work independently, the timings of the US patent grant and the Chinese patent grant for the same invention are exogenous to the patenters. I find the earlier event of patent grant issued by either the Chinese or the US patent office significantly increases the probability of the US patent transfer. My empirical findings suggest that early resolution of uncertainty related to patent rights contributes to technology partnership. They also suggest that Chinese patent grant is a useful signal of the quality of the inventions.

A second project investigates the role of the "weak patent protection" as a litigation tool. The Chinese patent office provides two types of patent protection that differentiate over protection speed, length and validity. The "weak patent protection", namely the utility model, suffers from both a shorter term of protection and a higher uncertainty of enforcement. Admitting that the legal protection for the utility model is weaker, I analyze firms' strategies with respect to filing utility models in a sequential game with asymmetric-information. My model suggests that under the assumption that the patentee knows more about the validity of the utility model than his competitors, he might strategically choose to file for utility model to catch his competitor "off-guard." In equilibrium, firms utilize utility models to deter infringement activities.

My third project examines the casual impact of knowledge spillover on firm-level R&D investment. In the United States, patent examiners need to cite related patents when examining a patent application, creating a channel of knowledge spillover between different parties. The diligence of an examiner, however, will determine the quantity of citations he/she makes to a patent application, creating an exogenous variation in knowledge spillover. I find lazier examiners (as measured by the amount of workload within a given time) have a deeper impression of the patents they examined and hence, are more likely to cite their examined patent when examining patent applications in the future. To the contrary, diligent examiners are more neutral in citing patents: their probability of citing patents they reviewed before and other patents are similar. This project is still under progress and I hope I can reach some interesting empirical results by the end of 2014.