



Changes in academic entrepreneurship among  
Japanese university bioscientists, 1980-2012.

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**Dissertation Abstract**

The dissertation examines how Japanese university scientists in the biosciences responded to legal and institutional changes in academic entrepreneurship. The changes increased the number of university-firm interactions. However, the scientists also maintained practices that were not the intended consequences of the policy interventions, including collaborating informally and creating startups in the United States. The resulting structure of academic entrepreneurship in Japan was a juxtaposition of its old practices, new procedures, and opportunities abroad. By identifying ways that scientists can shape how policy is enacted at the local level, the dissertation complicates the current picture of the global diffusion of academic entrepreneurship.

**Category:** Sociology: Economic Sociology, Sociology of Science: University-firm interaction

**Key words:** Economic Sociology, Bayh-Dole Act, commercialization, institutional theory, Japan, universities

## **Executive Summary**

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The dissertation examines how Japanese university scientists in the biosciences responded to legal and institutional changes in academic entrepreneurship. Beginning in the 1990s, the Japanese government initiated a series of policy initiatives that attempted to imitate the U.S. academic environment's approach to promoting entrepreneurship. Using archival resources, interviews with prominent scientists, and quantitative methods, the study shows how Japanese university bioscientists responded to these policy and institutional changes.

Concretely, I detail how the Japanese government recognized Japan's relative tardiness in academic entrepreneurship and implemented various policy changes to encourage entrepreneurial activities, and how such initiatives promoted academic entrepreneurship in Japan. To name a few initiatives, in 1999, Japan passed the Japanese Bayh-Dole Act,—the equivalent of the U.S. Bayh-Dole Act, which allows universities to be patent owners of the findings of nationally funded research. In 2001, this was followed by an ambitious intervention designed to develop startups with university-produced scientific knowledge. Then, finally, The National University Corporation Act of 2004 allowed national universities to freely develop their own

strategies regarding university-industry collaboration. Such measures were primarily and explicitly modeled on the commercialization environment of the United States. Japanese university scientists thus had to adapt to a new policy and institutional environment that was intended to “Americanize” Japanese university-industry interactions.

The changes created a new environment. University patenting was encouraged, and collaborations with firms were presumed to have clear, formal contracts through university administration. Japanese university bioscientists, however, did not simply follow the new rules for academic entrepreneurship. Instead, they created a set of practices that only loosely conformed to the new rules. The study identifies two sets of conditions for the emergence and development of such practices: Chapter 1 describes that the scientists’ previous practices, which fostered gift-exchange-like trust relationships with collaborating firms, and Chapter 2 shows how the scientists’ transnational experience made them aware of the different possibilities and methods for commercializing their inventions around the globe. In Chapter 3, I then use a quantitative measure to test the generalizability of the findings, drawing on a novel dataset of 2,203 Japanese university scientists who had HighlyCited publications, building on the COMETS database by Lynne G. Zucker and Michael R. Darby at UCLA. The policy changes prompted Japanese university scientists to interact with firms more often, and seek intellectual property. In this sense, the policy initiatives achieve their intended effect – they made Japanese academia a place where interaction with industry is legitimized and further encouraged. However, the policy changes did not eliminate the previous practices of working with firms informally and releasing the intellectual property rights to such collaborating firms (and only remaining to be the “inventor” on patent applications).

The dissertation draws several conclusions. As I show quantitatively, the policy and institutional changes in Japanese academic entrepreneurship increased the number of university-firm interactions. However, as the interview-materials show, Japanese university scientists also maintained entrepreneurial practices that were not the intended consequences of the policy interventions, including collaborating informally and creating startups in the United States. The resulting structure of academic entrepreneurship in Japan, therefore, was a juxtaposition of its own old practices, new procedures, and opportunities abroad. In some respects, this new structure resembled the old structure more than the American one that policy makers had sought to imitate. By identifying ways that local actors can shape how policy is enacted at the local level, the dissertation complicates the current picture of the global diffusion of academic entrepreneurship.

### *Summary of Chapters*

The first chapter delineates how Japanese university scientists created new practices under the new rules on academic entrepreneurship. In the late 1990s, Japan began to imitate the United States' method of promoting academic entrepreneurship. Previously, Japanese scientists maintained informal, trust-based relationships with firms: scientists received "donations" from firms and, in return, provided the "favor" of intellectual property rights. But the new legislation constrained and even prohibited university scientists' previous practices of informal collaboration with firms. Drawing on interviews and archival research, the chapter examines how previous gift-exchange like, trust relationships with firms affected the ways in which Japanese university scientists enacted new practices under the new rules.

New legislation regulating university-industry ties constrained and even prohibited university scientists' previous practices of informal collaboration with firms. Japanese university scientists who already had ties with collaborating firms did not want to sever such ties and expectations of reciprocity. Thus, they tried to avoid breaching their gift-exchange-like relationships with collaborating firms by neglecting, partially following, or working around the new rules to keep giving favors to firms. Japanese university scientists thus (a) resorted to the previous arrangement of working informally through donations and handing over IPs even though it was now a legally dubious practice, and/or (b) followed the new formal procedures at least partially but also tried to replicate the informal pattern as much as possible by negotiating the terms of the formal collaboration agreement with university's Office of Research. So for example, Japanese scientists would negotiate with their university's Office of Research for the firm's IP rights, or they would start joint research without a formal research agreement and then go through the formal procedures later only if the collaboration seemed likely to be long and successful. Drawing from institutional theory in sociology that points out that an adoption of formal rules from external sources leads to decoupling of the rules and work activities, I specify how the management of difference between the written-out rules and actual practices is accomplished: local actors reappropriated the new system and "pulled" it closer to the old set of practices so they could sustain the relationships in which they were already enmeshed.

In chapter 2, I look at how the transnational experience of Japanese university scientists shaped the ways they responded to changes in academic entrepreneurship. Choosing a policy is increasingly a globalized affair, in that countries tend to imitate the policies of whichever country deemed superior in that policy domain. But local actors, who then have to deal with the

real-life consequences of that policy adoption, are also globalized, in that they travel beyond national boundaries—as do resources and ideas, even in the rare cases when local actors do not. I show that the Japanese university scientists were “cosmopolitan,” in that they already had extensive knowledge of and experience with the “American way” of engaging in academic entrepreneurship. They had acquired this knowledge and experience well before the changes took place, either by working in the United States themselves or by working with U.S. scientists and firms. Some scientists were already fluent in the U.S. style of academic entrepreneurship. Consequently, few of them entirely abandoned the old informal practices. In most cases, Japanese university scientists experienced the new rules through a transnational perspective that they already possessed and that was not a simple matter of them being “more Americanized.” Because they enjoyed having multiple pathways to academic entrepreneurship—for example, working with Japanese firms informally while also establishing a startup in the United States—they did not necessarily adopt one set of rules or another. Rather, scientists avoided committing to any particular commercialization environment and instead purposively selected resources, regulations, and opportunities across national boundaries.

The third chapter shifts focus from how bioscientists responded to the changes to how their patenting and publication behavior changed. To understand whether and how academic entrepreneurship has changed the way scientists commercialize their research, it is not enough to examine their narratives and recollections. Thus, whereas the first two chapters heavily rely on in-depth interviews with scientists, the third chapter examines numbers of publications and patents. I used COMETS database to find information about scientists’ publications, copublications with firms, patents that list the scientist as an inventor, and patents for which

firms are the assignees. I use this data to examine the effects of the measures that the Japanese government adopted to promote university-industry interaction and academic entrepreneurship. The results indicate that the Japanese Bayh-Dole Act and other policy initiatives did influence the scientists to collaborate with firms and more actively seek intellectual property rights, both through the formal channels the changes established *and* the informal channels the scientists and firms had cultivated through their previous collaborations.

Concluding, I built an explanation of change in Japanese academic entrepreneurship by delineating the processes through which local actors—Japanese university scientists—understand, negotiate, and respond to change. Whether we call the deviation from the original, American structure of entrepreneurship “innovation” or “hybrid” or even “failure,” local actors ultimately hold the key to understanding how imported and imitated institutional and organizational patterns become embedded in the adopting society. The Japanese university scientists I studied were active participants in creating the new, compromised (or hybrid), structure of academic entrepreneurship. Japanese university bioscientists responded to the policy initiatives and increased their engagement with industry but did so largely on their own terms.

Taken as a whole, the dissertation answers questions about how Japanese university bioscientists have organized their working lives at a time when Japanese academia is shifting drastically to be more commercially oriented. Policy initiatives increased university-firm collaboration and university-originated patents. At the same time, the new structure of academic entrepreneurship that is emerging in Japan does not resemble the one in the U.S. so much. The informal sets of practices Japanese university scientists used to employ when they interact with firms seem quite resilient. When their gift-exchange like practices of working through donations and giving IP rights to firms weren't strictly legitimate anymore, Japanese scientists and firms maneuvered to



find a pathway to maintain at least some of such practices. As a result, scientists neglected, partially followed, or worked around within the new rules to keep giving favors to the firms. Donations are still a vital part of university scientists' work life, and scientists still dish out IP rights to firms even when the Japanese Bayh-Dole Act and university regulations tell them to do otherwise. When they do work through the university Office of Research, it is common that university scientists negotiate for the firm so the university will share the IP rights of their invention by making the firm a co-assignee.

Moreover, even when Japanese scientists were used to the American way of formal collaborations, it didn't mean they simply switched to the new formalized procedures for their entrepreneurial action. This was the case with a few scientists, but not many. Instead, most scientists enjoyed having multiple repertoires of entrepreneurial action – and simply picked and chose how they worked with firms (donations? The Office of Research?) and where they commercialized their inventions (through Japanese firms, and let them pay for patents? Ask the University to patent? Use the American startup you have ties with?). Although the new policy environment did mean that the scientists were more legally bound to go through the formal route, they still selected their entrepreneurial mode of action using different repertoires of action.

Taking three chapters together, the dissertation indicates that Japan is probably never going to have the same structure of academic entrepreneurship as does the US. In the Japanese case, the previous informal practices persisted, and, anecdotally, there are more and more university-firm co-owned patents. That is, Japanese universities increasingly claim the IP rights of faculty inventions, but often share such rights with the collaborating firm on the condition that they pay for application and maintenance fee. This is practically a replication of the “good-old ways” of handing down the IPs exclusively to the collaborating firms, as Japanese patent law requires all

the assignees to agree to license the invention; the collaborating firm may use the IP as one of the assignees free of charge (or by paying an agreed upon sum of money), and virtually no competitor can come and license the IP from the university. Japanese policymakers, university administrators, and scientists do not seem to be troubled by this arrangement.

The dissertation thus provides insights into the structure of globalization and the dynamics of local implementation. Looking at other countries around the globe is telling: no other countries that had imitated the US are actually enacting “the American way” exactly despite the initial isomorphic decision to adopt US policies. Thus, these findings are not entirely Japanese specific. As I briefly mentioned in Chapter 1, many European countries still practice firm-ownership of faculty inventions or other ways of handing over inventions. Summarizing, it seems that the American model in which the university single-handedly owns faculty inventions and aggressively pursues licensing doesn’t quite materialize in most other countries that once tried to model themselves upon the US structure of academic entrepreneurship. The resulting structure of academic entrepreneurship in adopting countries, therefore, may be a juxtaposition of its own old practices, new procedures, and opportunities abroad. By identifying ways that local actors can shape how policy is enacted at the local level, the dissertation complicates the current picture of the global diffusion of academic entrepreneurship.