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Close enough but not too far: Assessing the effects of university–industry research relationships and the rise of academic capitalism

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ABSTRACT

Analysts assessing the impact of university–industry research relations (UIRRs) and increasing proprietary behavior on the part of universities often focus on single-indicators or adopt promotional or critical stances. However, assessing impacts of shifts toward a more proprietary university is inherently complex because of potential countervailing or mediating factors within working relationships. From interviews with 84 biological scientists at nine universities we find scientists view UIRRS and university intellectual property (IP) policies in complex and often conflicting ways. For example, university scientists believe UIRRs are valuable for increasing contact with scientists, but are problematic because working with industry can restrict communication among scientists. Also scientists believe university IP policies should shield their work from opportunistic behavior and at the same time be designed to attract industry partners. In addition scientists believe universities use their IP policies primarily as revenue raising vehicles and secondarily to address public good issues such as technology transfer.

1. Introduction

According to Nelsen (1991, p. 39), "The University was the birthplace of the biotechnology industry, and it continues to be the source of most of the basic new technology that fuels the industry." He argues that university–industry research relationships (UIRRs) are the "lifeblood" of the biotechnology industry because university biological research is by its nature basic and embryonic (Nelsen, 1991, p. 39). To secure access to the intellectual property associated with new discoveries and technologies, private biotechnology firms seek to develop and strengthen their relationships with universities. Such relationships have been important for agri-biotechnology applications since much of the research and technology transfer that has yielded transgenic crops has come from industry relationships with U.S. public land-grant universities (Busch et al., 1991; Charles, 2001).

Rudy et al. (2007) argue that the historical development of land-grant universities has been driven by two sometimes competing missions. One, a populist mission, is to serve the public good through the production and dissemination of scientific and technical knowledge that is widely available and useful to a broad range of rural residents and entrepreneurs. The other is to enhance

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the productivity of agriculture through the development and transfer of technologies and dissemination of scientific farming techniques. When these two missions have conflicted, administrators have had to negotiate and compromise on their institution's commitment to one or both (Rudy et al., 2007). The relationship between land grants and the agri-biotechnology industry, combined with legislative and policy changes that promote a more market-oriented research and development policy environment, has highlighted the tension between these two missions. The most prominent agricultural example of this tension may be the controversy surrounding the now defunct UC Berkeley-Novartis agri-biotechnology research agreement (see Busch et al., 2004; Kirp and Popp-Berman, 2003; Rudy et al., 2007).

Three interrelated developments lie at the center of the debates concerning the appropriate links between land-grant universities and private firms and their effects on the university's societal role: (1) a series of legislation (beginning with the Bayh-Dole Act of 1980), executive orders and court decisions served to facilitate patenting of federally funded research and drove increases in the number of universities actively engaged in patenting and licensing technologies and discoveries (Mowery et al., 2004); (2) the decrease in state and federal support for agricultural research relative to private sector investment (Caswell and Day-Rubenstein, 2006); and (3) the increasing emphasis on university biotechnology research as an engine of innovation that promises to lead to economic growth through the commercialization of new technologies (Slaughter and Leslie, 1997; Mowery et al., 2004; Rudy et al., 2007; Shane, 2004).

In fact, many of the scholars investigating the emergence and expansion of the biotechnology industry view these three developments as interconnected with economic cycles. These scholars view the biotechnology industry as a response to the realization of the limits of nationalist-centered, mass-production development projects that were dominant in the second half of the twentieth century (McMichael, 2000). As the ability to realize sustained economic growth and profits through such approaches peaked in the late 1960s and early 1970s, the new technologies that comprised the "information economy" provided the opportunity for companies to add value to the production process (Kloppenburg, 2004; Kenney, 1986). They also facilitated a shift away from nationalist-centered development strategies toward a more global division of labor by increasing the mobility of capital and firms (McMichael, 2000). These developments in turn put pressure on the fiscal situation of national and sub-national governments, making it more difficult to raise funds for financing public investments in such things as agricultural research (Slaughter and Leslie, 1997).

In general prior to the 1980s, it was widely perceived that efforts to initiate biotechnology developments in the United States had been hindered by the fact that the labor and expertise that were to spur the commercial biology phenomenon had been located in U.S. research universities, which had, for the most part, been sheltered from labor and commercial market forces (Slaughter and Leslie, 1997; Kenney, 1986; Sampat, 2006). In the case of agri-biotechnologies, a second obstacle to developing commercial applications emerged as public funding for research universities declined (Buttel et al., 1984; Kleinman and Vallas, 2001; Caswell and Day-Rubenstein, 2006). A strategy for overcoming these obstacles has been to structure research performed at U.S. universities to be more readily utilized by U.S. firms (Buttel et al., 1984; Mowery et al., 2004). Through legislative changes such as the 1980 Bayh-Dole Act and the 1986 Federal Technology Transfer Act that promoted university–industry collaborations, and through funding from the federal and state governments and direct investments from biotechnology firms, research universities became the primary source of new biotechnology techniques and products (Busch et al., 1991). Described as the emergence of "academic entrepreneurship" and "academic capitalism," universities have created and expanded technology transfer and university–industry relation offices to promote collaborations and the marketing of research discoveries, created or revised policies to enable university professors to form start-up companies, and generally pursued a shift in emphasis to producing research for commercial applications (Slaughter and Leslie, 1997; Shane, 2004). These changes have led to a burgeoning literature (descriptive, promotional and critical) that analyzes and assesses their impact on the functioning of the university and the net benefits to society.

In this paper we take a brief historical look at the linkages between universities and industry and the proprietary activity of universities, and then review the descriptive, promotional and critical literatures of the impacts on the university and society from the university's shift toward a more proprietary orientation. After this we provide the outline of a framework for assessing the outcomes linked to academic entrepreneurialism based on our observation that it is often the beneficial aspects of university–industry relations that can also be the most problematic, and vice versa. We support this paradoxical assertion through the use of interview data collected from 84 agricultural scientists with industry connections at nine universities (the majority of the interviews come from six major land-grant universities). We conclude by making the case that university-level policies, especially university IP policies, are critical vehicles for managing the relationships between industry and universities in order to enhance the long-term economic and social welfare of universities, their scientists, and private sector firms.

2. Assessing the effects of academic capitalism

In a political–economic analysis of the Bayh-Dole Act, Mowery et al. (2004) find that patenting activities at universities and by university scientists has a long history in the U.S. In fact, in 1907 the UC Berkeley scientist Frederick Gardner Cottrell received the first of several patents on an air pollution control mitigation technology. However, Cottrell declined to have UC administer the patents because he believed that "...the involvement of university administrators in licensing management could have detrimental consequences for the culture of scientific research at the university (Mowery et al., 2004, p. 59)." Mowery et al. (2004) go on to document selective participation in patent-