

Changes in intellectual property statutes and policies at a public university: revising the terms of professional labor*

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Abstract. In this paper, we look at the way the state has helped shape the climate for the commercialization of science in a public university, and at how this has shaped the terms of professional labor for faculty. We examine patent policies of a public research university and of its Board of Regents, and the relevant state statutes from 1969–1989. Policies and statutes moved from an ideology that defined the public interest as best served by shielding public entities from involvement in the market, to one that saw the public interest as best served by public organizations' involvement in commercial activities. Claims to the ownership and rewards of intellectual property shifted dramatically in that time, from faculty owning their products and time to complete ownership by the institution. The contract between the university and faculty became increasingly formalized and specified. We believe that such developments augur significant changes in professional labor and in the relationship between the state and higher education. Such changes can best be understood from a post-structuralist perspective that moves beyond the structural dichotomies of public and private, state and higher education, administrator and professional, and points to new forms of organization and of professional stratification and interest formation.

Faculty at American public universities were always involved in commercial aspects of science. Faculty participation in commercial science took various and complex forms, ranging from government and corporate sponsorship of commercial science to intricate organizational arrangements covering state-corporate-university organization for production. In the 1910s and 1920s, science-based electronics and chemical industries sponsored and participated in work at MIT (Noble 1977). The United States Department of Agriculture supported the development of hybrid seed corn through cooperative hybrid breeding programs at Harvard and Cornell in the 1920s (Berlan and Lewontin 1986). Insulin was discovered and patented by a faculty member at the University of Toronto in 1921, and subsequently produced by Eli Lilly in the U.S. (Harris 1946). In the 1930s, the University of Wisconsin supported the patenting and commercial development of Warfarin and vitamin-D milk irradiation through the WARF foundation. In the 1950s, the Department of Energy organized the production and marketing of commercial nuclear energy via General Electric, Westinghouse and major university centers.

Although American professors and universities had a good deal of experience with the commercial sector, the nature of their involvement intensified, indeed,

* Despite the changes in intellectual property policies at our university, one of the ongoing terms of our joint professional labor is that we share equally in the research and writing of our work products, which lack commercial relevance but not, perhaps, some value.

changed definitively during the 1980s. The 1980 federal patent law was a harbinger of the new commercial climate. This law enabled universities to own patents based on faculty scientists' work on federal grants, to make profits from them, and to move beyond discovery and innovation to production. It made unnecessary the common university practice of granting non-exclusive licenses on patents, moving universities more aggressively into commercial activity based on scientific discovery (Dickson 1984; Bok 1982). At the state level, new statutes encouraged state and university ownership of scientific discoveries made by faculty (Johnson 1984; Slaughter 1987; Feller 1986). At the system and institutional level, revised regental and university policies promoted faculty involvement and defined claims to ownership in research endeavors with commercial applications.

There has been a substantial amount of research done on institutional involvement in and responses to the opportunities presented by such changes in law and public policy, often under the rubric of technology transfer (Fairweather 1988; Slaughter 1990). However, there is virtually no research that speaks to the ways in which changes in state statutes and public policy address, expand, or otherwise accommodate the window of opportunity created by the federal law. Yet the several states, in dealing with the opportunities for commercial science at public institutions, are rewriting the social contract between the state, the university and society, and, at a more literal level, the employment contracts of professors.

In this paper, we tracked the rewriting of public policies and state law from a decade before to a decade after the 1980 Government Patent Policy Act to get a sense of changes over time and of the effects of changes in the federal patent law. We examined University of Arizona policy, Arizona Board of Regents Policy, and Arizona state statutes with regard to commercialization of science from 1969–1989.¹ Analytically, we focused on the role of the state in the commercialization of science and in shaping the terms of professional labor. We were particularly concerned with legitimization of claims to ownership and rewards of intellectual property, with authority regarding the management of commercial science and with the ideological justification of commercialization of science.

The dominant theoretical treatments of the state, higher education and academics in the past two decades see the state as an external regulator of academic institutions and scientific marketplaces. The regulatory perspective has led to research on the effects of government regulations on institutional practices, administrative costs, and quality (Finn 1978; Volkwein 1987, 1989). With regard to the commercialization of science, those utilizing the regulatory approach try to work out what regulations and rules facilitate technology transfer, and generally take the position that technology transfer flourishes most strongly when there is unimpeded contact between faculty and corporate personnel, a minor variation on the theme that the best regulation is the least regulation (Peters and Fufeld 1982; Business-Higher Education Forum 1983). As was the case with the change in the federal patent law, the aim is to minimize bureaucratic obstacles and provide incentive for entrepreneurial academic scientists. The regulatory perspective assumes that institutions of higher education are separate from the state, and that the state is external to and impedes the natural, efficient functioning of scientific

and educational marketplaces. Moreover, the state is treated as if it were a single entity, not a variegated set of agencies and institutions. Consistent with this view of the state is a functionalist view of academics as relatively autonomous professional whose control of their work and work place is a function of their scientific knowledge and research expertise (Clark 1987). As faculty secured greater federal research funding, they increased their power and autonomy within the academy (Jencks and Riesman 1969).

An alternative theoretical treatment of higher education, the state, and academics has been developed by power elite theorists, neo-marxists and critical theorists. This perspective sees corporate capitalists as using the state to work their will on universities, often by coopting professional associations or groups of scientists through foundation monies and other resources (Barrow 1990; Domhoff 1970). With regard to the commercialization of science, the critical perspective points to the interconnection between the interests of corporate capital and state sponsored applied science (Kenney 1986; Noble 1977). Ironically, as with the regulatory approach, critical theorists tend to assume that the university is separate from the state, the state is distinct from the private sector, and that the state is relatively undifferentiated. Unlike the regulatory theorists, the critical view of faculty is that academics' control over their work stems from their collective political activities and their service to powerful groups and classes (Collins 1979; Larson 1977). As faculty's work has become more commercially relevant, it has been steered more by the capitalist interest it serves.

We find that neither theoretical approach captures recent developments in the relations among states, universities, and faculty. Although public universities are chartered by the state and the majority of their funding comes from the state and federal governments, institutions of higher learning have long resisted being defined as state agencies. Just as faculty have resisted being defined as state employees, universities have negotiated more autonomous designations. However, recent litigation surrounding intellectual property has defined public research universities not as independent enterprises, but state agencies, just as university administrators and faculty have been defined not as managers and scientific entrepreneurs, but as state employees (Rhoades and Slaughter 1990; Sackey 1992).

Moreover, organizational arrangements surrounding the commercialization of science suggest that the boundaries between public and private are increasingly blurred and formally permeable (Slaughter 1990). The University of Arizona, for example, now owns profit generating, taxable intellectual property, in the form of patents, is engaged directly in production of products and processes, as in the case of Lightning Locator and Protection Corporation, and indirectly, through the ownership of arms-length corporations or foundations, and of a technology development corporation. Through various state agencies (such as economic development corporations) and state funds (such as pension funds, special technology transfer funds, and state budgeted monies that support technology transfer activities and offices), many states organize and underwrite commercial activity in scientific and technological markets. They seek to stimulate and facilitate such activity rather than to impede it (as in the regulatory approach) and the state often acts as the initiator

rather than responding to demands of corporate capitalists in the marketplace (as in the critical approach). In analyzing such activity, it is clear that “the state” is multifaceted, that there are different sectors and interests in the state, and that these entities have complex relations with organizations and interests inside and outside the formally designated state. Various public policies bear directly and indirectly on the commercialization of science, from state statutes on conflict of interest and technology transfer to comparable policies and regulations promulgated by state boards of regents and public universities. The messages of these public policies may be somewhat different, even contradictory. Occasionally, professional associations and groups of scientists are seen as actively and independently aligning with corporate capital to use the state to secure advantages for themselves (Dickson 1984; Silva and Slaughter 1984). But as the commercial potential of faculty labor has increased, (state) academic institutions have worked to ensure relative autonomy and special treatment for faculty involvement in commercial science and at the same time to establish their claims to the proceeds of that faculty activity. The nature of the negotiation over the terms of professional labor, then, are more complex than either the dyadic relations between administrators and professionals in the functionalist perspective, or the dependent relations between professionals and corporate capitalists in the critical perspective.

Methods

We pursued two research questions in an investigation of statutes and policies dealing with patents and technology transfer: (1) What is the role Arizona state statutes and regental and university policies in shaping the commercialization of academic science?; and (2) How do Arizona state statutes and regental and university policies relating to the commercialization of science define the terms of academic labor in state universities? We examined three time series archives over a 20 year period (1969–1989); University of Arizona policies, taken from the official Faculty Manuals; Arizona Board of Regent policies, taken from the administrative rules and regulations covering the university; and Arizona state statutes, taken from the legislative record. Although our research is based on examination of the policies of a single state, at least one other state, Texas, has policies that parallel those of Arizona (Olivas 1992). Research at the institutional level confirms that a number of large public and private research institutions are developing policies that increase institutional claims on faculty discoveries (Chew 1992). In some cases, as at Arizona, policies attempt to claim “ownership of all faculty intellectual property produced by faculty in the course of their employment and while using university resources but also for any inventions or patent rights from all faculty activities and for any inventions that may derive from sponsored research agreements with non-university funders” (Olivas 1992, p. 578). Many institutions do not take such an extreme position, but almost all of the 20 largest funded research institutions presume that they own faculty inventions and are able to decide what portion of profit from the discovery should be awarded to faculty. Although there are

undoubtedly idiosyncrasies in Arizona policies, Arizona is not atypical of research institutions attempting to increase institutional claims to faculty invention in the face of professors common law claims to their intellectual property.

In order to address our two research questions, we conducted a line by line rhetorical and thematic analyses of the statutes and policies and coded the data into three categories stemming from each of the research questions. Our first category has data about the *ownership and rewards* of the products of faculty's activities in commercial science. Who owns the products of faculty's activities, and what are the claims on the proceeds of these activities? Our second coding category has data about the *ideology* used to explain and justify state and faculty involvement in commercially relevant science. To what extent do belief systems about academe and about the public interest appear, and how are they defined? Our third coding category has data about patterns of *administrative roles and control* in managing the commercialization of science. Such patterns include: who/what is at the top of the chain of command; the extent of formalization, measured by the length of the document and the areas of activity that are addressed; and the degree of administrative discretion, operationalized as the number of areas in which administrators are given discretion to make certain decisions.

The coded data was analyzed and is presented in a longitudinal framework that focuses on the direction and scope of changes. For University and Board policies, the coding and analysis were simplified by the fact that new policies were revisions that essentially followed the format of preceding policies. We traced omissions and additions/changes. For University and Board policies, we detail these changes at three data points when policies changed – 1969, 1977 and 1988 (see Tables 1, 2 and 3). Our interest is both in changes in the coding categories and in patterns of sequence in these changes. Were the changes linear, and at what policy level did they originate? In the case of state statutes, the coding and analysis were complicated by the fact that we were dealing with discrete pieces of legislation that often bore little or no relationship to other statutes and sometimes covered state agencies other than universities. We coded each statute and looked for patterns of change over time in ownership and rewards, ideology, and administrative roles and control. We also considered the order and consistency of state statutes in relation to University and Board policies.

University of Arizona patent policies

We analyzed the 1969, 1977 and 1988 patent policies of the University of Arizona. The format of these policies remained largely the same, although some sections were amended, added, and/or changed. Each of the policies had a General Statement expressing intent and orientation, and a Patents section (copyright is covered by a separate policy) in which general processes and principles regarding the patent policy were discussed. Policies in later years had a Procedures section, which expanded upon some of the paragraphs of earlier policies. The policies ranged from two to four pages.

The data are presented in the coding categories of *ownership and rewards*, and *ideology* and *administrative roles and control* (see Tables 1, 2 and 3). The patterns are clear. The role of the state in commercializing science became more prominent over time. The state was increasingly the owner, organizer and producer of commercially relevant scientific products and activities. Accordingly, the terms of academic labor became more contractualized. Faculty became increasingly like employees in a private enterprise in terms of managers' control of their commercially relevant research activities. In 1969, the *ownership and rewards* claims of faculty and the university were substantial. By 1988, the claims of faculty were greatly reduced, the Board of Regents initiated claims for itself and those of the University were increased. The *ideology* underlying the policies also changed dramatically. In 1969, academic ideology was invoked through language that concentrated on science and research. In 1977, conceptions of public interest were introduced, and were counterpoised to private profit, differentiating the role of state institutions from for-profit organizations. By 1988, profit oriented activities, and the state's involvement in them, were presented as essential to the public interest. Finally, the scope of *administrative roles and control* defined in the policies changed considerably. From 1969 to 1988, the chain of command was extended from the university to the Board of Regents to the State, policies became increasingly formalized and lengthy, and the discretionary responsibilities of university administrators were expanded.

Ownership and rewards. Perhaps the most dramatic policy changes came in the area of ownership and rewards (see Table 1). Faculty claims were drastically reduced, and the claims of the Regents and the University were introduced and increased. The changes made the Board of Regents an owner of commercial intellectual property, increased University benefits from commercial science and allowed the university wider scope with regard to commercial activities, including production of goods and services. In the process, the policies changed from treating faculty as professionals who had their own time outside the control of the university to treating them as salaried employees whose time was owned entirely by the university.

In 1969, "In general, inventions created by the faculty and staff . . . [became] the property of the University." However, the policy identified three conditions under which the faculty could own an invention. First, "This Patent Policy shall not apply where University personnel have conceived and/or developed inventions for employers other than the University of Arizona where such employment is permitted by the policies of this University." Second, "The inventor who conceives and/or develops an invention solely on his own time will receive the maximum percentage [100%] provided for such payments in the agreement between the organization to which the patent is assigned and the University." Third, the University may release the patent rights to the inventor, "[If] the President of the University considers that the idea is of insufficient value for consideration . . ." The faculty inventors had claims to an invention when they developed it for another employer on their consulting time, when they developed it "on their own time"

Table 1⁴. University of Arizona patent policies: ownership and rewards

		1969	1977	1988
Who owns the invention	Board	NA	x	x
	University	x	NA	x
	Faculty member	x	NA	NA
	External organization	x	NA	x
Faculty shares of proceeds of their inventions	Invented solely on university time	50%	25%	NA
	Invented partly on university time	75%	25%+	NA
	Invented solely on faculty time	100%	NA	NA
	Time is not mentioned in determining share	NA	NA	25% minimum

(e.g., after hours or in the summer), or when the university deemed it not worth pursuing.

The 1969 policy also accorded faculty substantial shares in the proceeds generated by those inventions owned by the University. The inventor received 50 or 75 percent of the payments from the patent management organization depending on whether the invention was conceived and/or developed “as a result of work for which he is paid by the University” or “partly as a result for [sic] work for which he is paid by the University and partly on his own time.”

The 1977 policy made the Board the owner of faculty inventions, and it reduced faculty claims. The policy eliminated the first two conditions of the 1969 policy under which faculty could claim ownership of their inventions. It also reduced the inventor’s shares in the royalties of inventions owned by the Regents to 25 percent, and distinguished between net and gross proceeds, providing the inventor with 50 percent of the first \$10,000 net dollars received by the university, and then 25 percent of the net amount in excess of \$10,000. In distinguishing between net and gross proceeds, and making the inventor’s share a percentage of net dollars, the policy made the University and Regents investors in commercial enterprise, financially backing the patent process by paying the difference between net and gross dollars. The 1977 policy also explicitly made the university an investor in commercialization: “All costs involved in obtaining and maintaining patent protection, domestic and foreign, shall be borne by the involved university or its nominee.” In the 1969 policy, such costs were borne by a patent management organization.

The claims of faculty to the rewards generated by their intellectual property were somewhat increased by the 1988 policy. In the 1977 policy, faculty could receive more than 25 percent of net amount received by the university in excess of \$10,000

if the inventor was judged “to have expended significant extra effort in attempting to commercialize the invention.” In the 1988 policy, the faculty share is defined as a *minimum* of 25 percent. The 1977 and 1988 University policies were simply reprints of Board policies for those years, reflecting the authority of the Regents. Building on the 25 percent minimum, the University later established an “Income Distribution Policy” that accorded faculty, after the first \$10,000 net dollars, 100 percent of the next \$10,000, 50 percent of the next \$40,000, 35 percent of the next \$500,000, and 25 percent of the net dollars beyond one million, in an effort to increase the incentive for faculty to engage in commercial science.

However, the 1988 policy was less generous to faculty in defining them as full-time, salaried employees. The 1969 policy recognized the possibility that faculty could conceive and/or develop an invention “solely on their own time.” The 1977 policy dropped that passage and phrasing, but recognized the possibility that faculty could conceive and/or develop an invention partly on their own time. In the 1988 policy, there was no recognition that faculty had time that was separate from and outside the control of the university.

Consistent with changes in federal law, the 1988 policy increased the ownership claims of the university, allowing it to own patents: “Each university may patent, market, and license inventions using its own resources.” The university became, in some respects at least, a commercial enterprise, investing its resources in activities that were designed to yield a profit that could be retained by the university. At the same time, the 1988 policy reversed the 1977 policy by recognizing the ownership claims of private enterprises on faculty’s intellectual property.

If patentable discoveries result from research sponsored by a for-profit organization, a university shall not enter into an agreement which gives the sponsor title or rights tantamount to title to such patentable discoveries. (1977 University of Arizona Patent Policy).

[T]itle to an invention may be assigned to industry, provided that the assignment documents contain provisions assuring adequate consideration is received by the university. (1988 University of Arizona Patent Policy).

Ideology. The reversal between 1977 and 1988 on the ownership claims of external organizations marked a major ideological shift (see Table 2). Public interest was defined quite differently in the 1977 and 1988 policies. In 1977, public interest was best served if titles and ownership were not transferred to a for-profit organization; in 1988, public interest was redefined to allow the transfer of technology and title to the private sector. In blurring the boundaries between the role and functions of the state and private enterprise, between public interest and private profit, the 1988 policy emphasized the value of faculty work that has commercial relevance.

The 1969 policy neither mentioned the public interest nor regulated the relationship between the university and external organizations. Commercial and contractual interaction among faculty, the university and external firms or organizations was not promoted, but it was authorized.

Should some person, group of persons, firm or organization pay in whole or in part for the investigation of some problem at the University, and should an invention be developed as a result of such a

Table 2. University of Arizona patent policies: ideology

		1969	1977	1988
Rationale (whose interests are served or threatened by commercial science)	Academic: commercial science serves academic science	x	x	x
	Public interest: public interest versus private gain	NA	x	NA
	Public interest: public interest is served by commercial science and private gain	NA	NA	x
Boundaries between state and private enterprise	Distinct	x	x	NA
	Blurred	NA	NA	x

cooperative enterprise, then the ownership of the patent shall be determined by the terms of the agreement entered into between the University and such cooperating person, group of persons, firm or organization.

However, a distance was maintained between the university and the private sector by assigning patent rights to patent management organizations, such as Research Corporation:

[The university] has recognized a limited number of organizations who have agreed to bear the cost of processing meritorious disclosures and of establishing and defending patent rights, and to undertake the marketing of such rights.

The proceeds coming out of the patent management organizations' efforts were to be channelled back into science. The language and rationale expressed an academic ideology of science conducted for its own sake, for the benefit of future scientific endeavors, rather than for external society.

A fund for the Promotion of Research shall be established by the Board of Regents of the University. In it shall be deposited all monies received by the University from financially profitable patents . . .

[B]enefits accruing to the University derived from such inventions will be used to further the academic or research program of the University . . . A substantial part of any income so derived will be returned to the University of Arizona for the support of research, investigation, or the establishment of research fellowships.

The public interest was not mentioned.

In the 1977 policy, the elements of academic ideology persisted, but references to the public interest appeared, and were prominent. Discoveries and inventions that belonged to the Board "shall be used and controlled in ways to produce the greatest benefit to the university involved and to the public and shall, at the same time, provide a corresponding benefit to the inventor." In discussing contracts or grants from sponsors or agencies that were governmental or nonprofit in character, the 1977 policy held that:

Prior to acceptance of such a contract or grant, the university shall determine that the retention of patent rights by the sponsoring agency is determined to be clearly in the public interest.

The definition of public interest differentiated state institutions from private enterprise and restricted interaction and arrangements between them. Contracts and grants with outside sponsors were restricted to governmental or nonprofit agencies. Faculty were no longer explicitly allowed to develop inventions for other employers. The 1977 policy omitted the following passage that appeared in the 1969 policy:

This Patent Policy shall not apply where University personnel have conceived and/or developed inventions for employers other than the University of Arizona where such employment is permitted by the policies of the University.

Faculty in public universities were now full-time employees, and their involvement with commercial enterprises was restricted. Intellectual property created in the public sphere could not be given to for-profit organizations.

The 1988 policy sustained the language of academic ideology found in earlier policies, but provided a quite different interpretation of the public interest from that found in the 1977 policy. The 1988 policy rejected the distinctions drawn between state institutions and for-profit enterprises, between public interest and commercial activities. The passages restricting university involvement with commercial enterprises were replaced with:

A university may enter into an agreement with an organization which assigns title to or rights equivalent to title in any patent held by the university . . .

In the ensuing sentences, the distinction between for-profit and nonprofit organizations was eliminated; all external agencies became "sponsors." The opening General Statement went further, encouraging arrangements between the university and for-profit enterprises, linking the public interest directly to the commercialization of science.²

The Board recognizes that in the interests of industry-university cooperation, state legislation encouraging technology transfer and board policy supporting research agreements which provide income for supplementing research support, title to an invention may be assigned to industry, provided that the assignment documents contain provisions assuring adequate consideration is received by the university.

The level of encouragement was such that the university was allowed to patent, market and license inventions. The state became a commercial actor. The public interest, and the interests of research and science, were served by the commercial activities of public university faculty.

Administrative roles and control. The shifts in ideology detailed above were accompanied by a consistent pattern that extended the chain of command, increased policies' formalization and increased administrative discretion over a range of areas

having to do with patenting (see Table 3). The state's role in commercializing science was extended beyond being an owner, to being an organizer and producer of commercial science. This work of faculty was circumscribed by increasingly specified procedures and conditions, and by the expanded discretionary power accorded campus level administrators.

In the 1969 policy, the University sat at the top of the chain of command appearing in the text. There was a relative lack of specificity on several procedures and definitions that in later policies came to be highly specified. Administrators were given discretion over two important decision making areas: determining whether an invention was conceived and/or developed wholly or partly on University time, or solely on the inventor's time; and determining whether to release a patent to an inventor.

The 1977 policy marked the entrance of the Board of Regents into the arena. Whereas the 1969 policy mentioned the Board only once, the 1977 policy was filled with references to the Board. Yet the 1977 policy accorded campus administrators increased control and discretion over faculty's commercially relevant work. The 1977 policy was longer than the 1969 policy, and more specified. For the first time, there were references to exclusive and non-exclusive licenses, and to particular kinds of external organizations and sponsors with which the university or faculty might interact.

The areas over which administrators gained discretionary authority also increased in the 1977 policy. The "individual responsible for discoveries or inventions" could assign the invention to a particular patent management organization, a choice that was previously in the hands of the inventor. That same administrator could choose to add a share of the proceeds received by the inventor if they determined that the faculty member had "expended significant extra effort in

Table 3. University of Arizona patent policies: administrative roles and control

		1969	1977	1988
Top of the hierarchy	State	NA	NA	x
	Board	NA	x	NA
	University	x	NA	NA
Number of words in the policy		1554	1778	1893
	On whose time was invention conceived and/or developed	x	x	NA
	Release patent	x	x	x
	Assign patent	NA	x	x
Areas of administrator discretion	Increase share of faculty	NA	x	NA
	Make inventor pursue a patent	NA	x	x
	License invention	NA	NA	x
	Market patent	NA	NA	x
	Assign title	NA	NA	x

attempting to perfect or to commercialize the invention.” Finally, university officials were given the discretion to require that a faculty member patent a discovery.

The discoverer or inventor shall be required, if requested by the university official designated to be in charge of discoveries and inventions, to apply for patent protection on such discoveries or inventions in such countries as may be designated by said university official and to assign his interest therein to the university involved.

Such an administrative prerogative, if exercised, would take away faculty’s freedom to choose whether to patent or to publish and put ideas in the public as opposed to the private domain. The 1977 policy, then, provided for much more active and detailed management of the commercialization of science.

The 1988 policy represented a continuation of the trends traced above. It extended the chain of command up to “the state,” referring to state statutes. The formalization of the policy also increased, in length and specificity. The policy provided a definition of net income. It provided new and detailed sections on assignment fees, licensing, and “material interest” (the latter to deal with conflict of interest).³ On fees, it read:

In the event the university wishes to assign title, or rights equivalent to title, the designated patent official, when drafting the agreement, will include the following provisions: a. 1) An assignment fee is at least fifty percent of the total project support including all future contract modifications or extensions; or 2) The assignment fee between thirty percent and fifty percent of the total project support including all future contract modifications or extensions and a royalty agreement providing for payments not less than one percent of the net sales resulting from the invention. b. A reassignment right exercisable by the university following a two year period if the assignee has not and is not making a good-faith attempt to commercialize the assigned technology. c. The right of the university to retain a royalty-free license for use of the assigned invention.

The 1988 policy was increasingly contractualized. It also expanded campus administrators’ scope of discretion. The designated patent official decided whether the university would patent, market, and license inventions. That official was also responsible for assigning and negotiating title and license.

Arizona Board of Regents patent policies

The 1969, 1977 and 1988 patent policies of the University of Arizona were identical to the 1965, 1977 and 1988 policies of the Arizona Board of Regents. However, in the interim years, changes in Board policies were not reflected in new university policies. Moreover, the archives of the Regents policies included some drafts of policies that we were able to compare with final versions. Such data enabled us to continue concentrating on patterns of change in *ownership and rewards, ideology and administrative roles and control* and at the same time to consider questions of whether the University or the Regents initiated changes, whether the pattern of change was linear or involved reversals that suggested

ambivalence and/or disagreement over the direction to follow, and whether the policies were consistent with each other. We followed the development of two policy sequences, the first including two drafts, dated 5/25/72 and 5/24/74, that led up to the 1977 Patent Policy, and the second including two policies surrounding the 1988 Patent Policy, a 1985 Patent Policy and a 1989 Technology Transfer Policy. The drafts in the early 1970s pointed to the Board's initiative in establishing its ownership claims, introducing the ideology of the public interest, and extending the chain of command to itself. Such changes, like the change in the 1985 Regents policy allowing universities to own, license and market patents, were reflected in later University policies.

However, there were significant breaks in the regental policy sequence. The 1972 draft introduced much smaller shares for inventors in the rewards of commercial science than were provided for in the 1969 and the 1977 policies. The 1974 draft diluted and in some sections deleted the language of academic ideology that was reinstated in the 1977 policy. The 1989 Technology Transfer Policy instituted serious cautionary provisos regarding the commercialization of science and broke the pattern of how all previous policies defined academic ideology by suggesting that not just academic research, but instructional services should share in the proceeds of commercial science.

Sequence One: 1972–1977. Some of the changes in the 1972 draft appeared in the 1977 policy. The 1972 draft identified the Board as the owner of intellectual property. It introduced two passages invoking the public interest. One made the retention of patent rights by governmental or non-profit agencies sponsoring the research contingent on those entities “clearly serving the public interest.” Another protected the public interest by preventing the university from giving patent rights away to for-profit organizations that sponsored research. The 1972 draft indicated that inventors could be required to apply for a patent and to assign their interest to the university. It gave the university, rather than the inventor, control over assignment of patents to the patent management organization. And it eliminated the possibility of faculty getting larger shares for inventions conceived and/or developed solely on their own time.

Some of the changes made in the 1972 draft did not appear in the 1977 policy. In the 1972 draft, faculty shares were reduced to 15 percent with the possibility of the inventor receiving more if the invention was made “partly on his own time” and if the person is “judged by the patent committee to have expended significant extra effort in attempting to perfect or to commercialize the invention.” The 1977 Board policy also greatly reduced faculty shares from those in the 1969 University policy, but to 25 rather than to 15 percent.

None of the changes made in the 1974 draft appeared in the 1977 policy. Both the 1974 draft and the 1977 policy gave the Board a stronger role in commercializing science than did the 1969 University policy. But the 1974 draft gave the Board discretionary powers it did not retain in the 1977 policy. The 1974 draft also omitted certain passages relating to academic ideology that were reinserted in the 1977 policy.

In general, inventions created by employees, faculty, and staff will become the property of the Board to be used at its discretion. [1974 draft]

In general, inventions created by employees, faculty, and staff will become the property of the Board and the benefits accruing to the Board derived from such inventions will be used to further the academic or research programs of the respective universities. [from 1972 draft, replicated in 1977 policy]

A substantial part of any income so derived will be returned to the university involved. [1974 draft]

A substantial part of any income so derived will be returned to the university involved for the support of research, investigation, or the establishment of research fellowships. [from 1972 draft, replicated in 1977 policy]

In the 1974 draft, the idea that monies from commercial science would be used to support academic science was replaced by the Board and the University having complete discretion over how the proceeds would be distributed. However, throughout the 1974 draft, the “individual designated as in charge of discoveries or inventions” was replaced by a “patent committee,” a committee of five faculty appointed by the president, a change that was reversed by the 1977 policy. The 1977 policy retained the patent committee in an advisory role regarding policy, returning decision making responsibilities and final authority to campus administrators.

Sequence Two: 1985–1989. The 1985 policy was largely the same as the 1977 policy, with two important changes. With the change in federal law, the 1985 Board policy enabled the university to own patents, fundamentally changing its role in the commercialization of science. The 1985 policy also strengthened a clause in the 1977 policy regarding the university’s authority to require faculty to patent discoveries or inventions that they make.

The discoverer or inventor shall be required, if requested by the university official designated to be in charge of discoveries or inventions, to apply for patent protection on such discoveries or inventions in such countries as may be designated by said university official and to assign his interest therein to the university involved. [1977 ABOR Patent Policy]

The discoverer or inventor shall be required, if requested by the university official designated to be in charge of discoveries or inventions, to fully cooperate with the university in the application for patent protection on such discoveries or inventions in such countries as may be designated by said university official and to assign his interest therein to the university involved. [1985 ABOR Patent Policy]

As the stakes in patenting increased for universities, so too managerial control of academic labor increased.

In each of the policies in the 1980s sequence, there was ambivalence about commercialization and the public interest. The 1985 policy enabled universities to act as commercial enterprises in exploiting commercial science, but it retained strong passages from the 1977 policy regarding the public interest. The 1988 policy dropped a passage about agreements with governmental or non-profit sponsors

being “in the public interest,” and added a passage enabling universities to assign title to patents to for-profit organizations. Yet assignments of title to external organizations was “subject to final approval by the Board in the event a university employee has a material interest in the contracting organization or any entity engaged in a business relationship with the contracting organization,” suggesting that the public interest might be compromised by persons with material interests in the dealings between public universities and external organizations. As relationships between public and for-profit organizations changed, the control of public employees increased.

The Board’s 1989 Technology Transfer Policy was ambivalent about commercialization, the public interest, and academic ideology. It provided a cautionary note, if not a step back from the promotional approach of the 1988 Patent Policy towards commercializing science. Although its opening passage encouraged commercialization more than ever before, the policy stressed that the public interest should prevail over private gain.

The Arizona Board of Regents encourages the universities of the state of Arizona to engage in technological research and development while insuring that the public benefit takes precedence over private gain and assures that public funds or resources are not used for private benefit.

The public interest was explicitly tied to economic development, and was defined through the enumeration of cautionary conditions that must be met if agreements with external organizations were to be approved.

Each contract shall provide that any institutional financial support to the entity will ultimately be recovered or will ensure equivalent recovery in the form of additional educational, research or public service benefits to the institution. The contract shall provide that technology transfer activities carried out under the contract will promote the economy and development of the state or the nation without engaging in conduct constituting state competition with private enterprise . . . The president is satisfied that university instructional activities, research, and public service will not be adversely affected . . . The proposed agreement is not in violation of Board policy on competition with private enterprise. The employee has obtained permission of the Board where required by A.R.S. 15-1635.01.B [Arizona Revised Statute on Conflict of Interest].

The Technology Transfer Policy emphasized public interest concerns – for example, conflict of interest, competition with private enterprise – not expressed in previous policies. It offered an interpretation of academic ideology that pointed to the threat of commercial science to teaching, research, and service in the university. It called for an accountability in terms of costs that was entirely lacking in the patent policies.

The president of each university shall report annually to the Board concerning its technology transfer activities for the preceding year. The report shall include an analysis of income and expenditures detailed by source, such as licensing, royalty or fees, as well as the university’s prevailing standards for measuring performance of patent management arrangements and the performance evaluation results.

The policy acknowledged, and even emphasized, that technology transfer had not

just rewards, but considerable costs and liabilities.

The policy sequences of the Board reveal that academic labor in Arizona state universities became more contractualized and controlled as the state became involved in commercializing academic science. The sequence in the 1970s suggests that the Board was anxious to establish its ownership claims and control over the resources generated by commercial science, but that it was ambivalent about commercialization, particularly about compromising the public interest by giving away intellectual property that had been created and/or developed in a state university. The impact on the terms of academic labor was that faculty claims on ownership, on rewards, and on their “own time” were significantly reduced and/or eliminated. The policy sequence in the 1980s suggests that after establishing itself as the principal owner of faculty’s intellectual property, the Board was willing to grant public universities a more active and direct role in commercial science. Although the board modified its definition of the public interest to incorporate state participation in markets, the Board again demonstrated its ambivalence about how to define the public interest by introducing provisions about competition with private enterprise, conflict of interest, and cost accountability based on clear differences between state and for-profit enterprises. Despite the ambivalence, the Board permitted the university and faculty engaged in commercial science to act entrepreneurially, using state funds.

State statutes of Arizona

We identified five state statutes that were directly relevant to the commercial science activities of the University: Arizona Revised Statute (A.R.S.) Title 38, Chapter 3, Article 8, *Conflict of Interest of Officers and Employees* (1978); A.R.S., Title 15, Chapter 13, *University Research Development Purposes; Product Development; Corporations* (1983); A.R.S. Title 15, Chapter 240, *Transfer of Technology Developed by Universities; Patent Policies; Officer or Employee Interest in Private Entity* (1986); A.R.S. Title 35, Chapter 5, *Industrial Development Financing* (1986); and A.R.S. Title 41, Chapter 25, *State Government Competition with Private Enterprise* (1987). We briefly discuss each of the statutes to provide a sense of the policy environment set by the state law. The statutes obviously do not follow the format, and go well beyond the purview, of the University and Board patent policies. But they can be analyzed in terms of what they tell us about: the role of the state in commercializing academic science; about the terms of academic labor in state universities; about ownership and rewards, ideology, and administrative roles and control; and about the relationship between state statutes and University and Board policies.

The state statutes, like the University and Board policies, shifted from providing a restrictive message about the role of the state in commercial activities, to encouraging such activities. The statutes put ownership of intellectual property in the hands of the Board of Regents and allowed them to control and distribute most of the rewards of commercial science. The statutes initially subjected academics to

the same conflict of interest regulations as other members of the state, and later excepted them from prohibitions against engaging in and privately benefiting from commercial activities. Public interest, first defined in the statutes as being served by ensuring that public positions were not used by individual state employees to derive private gain, was later defined as being served by university employees' pursuit of private gain and service to private industry. The statutes gave almost complete discretionary powers to the Board and to university officials. The latest statute, regarding state competition with private enterprise, broke the pattern of strong state encouragement for commercializing academic science, instead taking a position that emphasized that educational values must inform selection and support of commercial activities and ventures. The state statutes and University and Board policies were somewhat inconsistent, particularly in their definitions of public interest. Finally, the sequence of the 1986 transfer of technology and 1987 competition with private enterprise statutes, and Board policies suggested that the Board and University officials lobbied the state legislature to pass legislation regarding commercial science.

The state's *conflict of interest statute* (1978) gave the university no preferential treatment; the university was one of many state agencies. None of the notes to the statute, which referred to concrete cases, applied to universities. For the most part, the 1978 statute sought to prevent individuals from benefiting privately from their state position, contrasting the public interest with the private gain of individual state employees. The statute prohibited various kinds of arrangements and actions, many of which could apply to entrepreneurial faculty.

Any public officer or employee of a public agency who has, or whose relative has, a substantial interest in any contract, sale, purchase, or service to such public agency shall make known that interest in the official records of such public agency and shall refrain from voting upon or otherwise participating in any manner as an officer or employee in such contract, sale or purchase.

The *university research development statute* (1983) enabled the Board to organize a corporation(s) "In order to stimulate the flow of capital into the development of specific products which have advanced beyond the theoretical stage and are capable of being reduced to practice on a commercial scale." Although individual members of the Board were not allowed to receive any direct or indirect compensation, the Board itself could hold voting shares in the corporation, which could enter into product development agreements and hold patents, copyrights and trademarks. Moreover, the Board could benefit financially from this and other arrangements.

The board may also enter into research and development agreements, royalty agreements, development agreements, licensing agreements and profit sharing agreements concerning the research, development, production, storing or marketing of new products developed or to be developed through university research.

The university research development statute (1983) marked the state's first move in taking a much more active and direct role in commercializing science, a move away

from restrictions in the 1977 Patent Policy against contracts between public institutions and for-profit organizations that did not clearly benefit the public. In the 1983 statute, the public was protected by conflict of interest prohibitions that prevented individual members of the board from benefiting personally from such arrangements. The public interest was defined much more specifically and contractually than in Board and University patent policies. The 1983 statute required product development agreements to have “contractual assurances that the benefits of increasing or maintaining employment and tax revenues shall remain in this state and accrue to it.”

Although the bulk of the *industrial development financing statute* (1986) dealt with the provision of low and moderate income housing, the Board of Regents was explicitly mentioned in the context of developing research parks. The statute enabled public agencies to form public corporations to serve essential governmental functions. The public interest ideology was strong. The public was protected from the possibility of official venality through conflict of interest regulations for public office holders. The public interest was specifically operationalized to mean that industrial development would provide, “adequate job opportunities and an improved standard of living for the growing population of this state and for the increase of prosperity.”

The *transfer of technology statute* (1986) was directed specifically to universities, and was easily the least restrictive and most promotional of the statutes with respect to commercializing academic science.

Notwithstanding title 38, chapter 3, article 8, [conflict of interest statute] an officer or employee of an institution under the jurisdiction of the Arizona board of regents may, subject to subsection C, apply to the board for permission to establish and maintain a substantial interest in a private entity which supplies equipment, material, supplies or services to the institution in order to facilitate the transfer of technology developed by the officer or employee of an institution under the jurisdiction of the board from the institution to commercial and industrial enterprises for the economic development of the state.

The restrictive conditions under subsection C of the statute covered employees disclosing their interest to the university president, satisfying the president that the undertaking “will benefit the economy of this state by contributing to the development of private enterprise” and that it will not “adversely affect research, public service or instructional activities at the institution.” Whereas the *conflict of interest statute* (1978) prohibited state employees from deriving personal gain from their public positions, the transfer of technology statute provided an exception to university employees. They were able to benefit from their interest in a private entity doing business with the university as long as the president determined that it did not “adversely affect any state interest,” which was left unspecified. The legislative intent of the statute was to promote partnerships between universities and private enterprise.

Such a strengthened partnership is an extension of one of the founding intentions for the university system and remains essential due to the external challenges posed by rapid technological advancements and economic growth. The legislature recognizes that the greatest public good will result from the hand

in hand cooperation of the public and private sectors as the economic and social benefits to be derived from such an effort are virtually unlimited for the further economic development of the state.

The public interest would be served by promoting private enterprise and by transferring to private enterprise technology that had been developed with the resources of state institutions.

The chronology of the developments described above is significant. The Board's 1985 Patent Policy, which enabled universities to own, market, and license patents, predated the *transfer of technology statute* (1986). Our knowledge of the University and its officials suggests that they lobbied the state legislature to pass this legislation, which then allowed the Board to incorporate the new language and rationale into its revised patent policies. Indeed, the Board's 1988 Patent Policy defined the public interest as being served by private gain in the way articulated in the *transfer of technology* (1986) statute.

The *competition with private enterprise statute* (1987) provided a cautionary note with respect to the activities that were promoted in the earlier transfer of technology statute. Its stated legislated purpose was to "regulate competition [with private enterprise] by institutions of higher education unless it enhances an educational or research function." However, the principle that guided community college and university involvement in commercial activities was open to a variety of interpretations. The statute read that commercial work must provide "a valuable educational or research experience for students as part of their education or fulfil the public service mission of the community college or university."

Moreover, the *competition with private enterprise statute* (1987) seemed to contradict other statutes. In contrast to the *transfer of technology statute* (1986), the *competition with private enterprise statute* (1987) saw public institutions' involvement in commercial activities as posing a threat to private industry in the state. In contrast to the 1986 statute, the 1987 statute justified university involvement in private enterprise in terms of academic ideology rather than an ideology of the public good.

The relationship of *competition with private enterprise statute* (1987) to Board policy is revealing. Board competition with private enterprise policies date back to 1981, and are similar to the 1987 statute, suggesting that the state statute was modelled on Board policy. However, the unclarified relation of the *transfer of technology statute* (1986) to the two 1987 statutes, and the several contradictions between the two 1987 statutes suggests that different state sectors do not always have congruent policies.

Discussion

Our first research question asked how Arizona state statutes and policies shaped the commercialization of academic science. At a very general level, Arizona statutes and policies followed the example set by the federal patent law. The 1980 federal law was presented as serving the public interest by reducing mission agencies' non-

productive ownership of intellectual property. In place of the federal government, universities and small businesses were given the right to own and exploit intellectual property through alliances with private sector enterprises that would stimulate the economy (Slaughter 1990). The federal legislation overturned the university's traditional position with regard to intellectual property, a tradition in which intellectual property was the by-product rather than the goal of the quest for knowledge and in which licenses were non-exclusive rather than exclusive, the better to protect the public interest. So too, the Arizona state legislature came to define the public interest as best served by the pursuit of private profit, moving from an ideology that protected the public interest by shielding public entities from involvement in the market to an ideology that saw the public interest as being well served by public engagement in the private sector.

As Arizona statutes and policies were re-written to respond to changes in federal law and to changes in the political climate, the relationship between public universities and the private sector changed substantially. The boundaries between the public and private sectors became blurred, permeable, easily altered. The university was able to hold and profit from intellectual property. Some state actors and sectors, some university administrators and some faculty became owners and producers in commercial science markets. Contrary to regulatory theory, the state became more than an external regulator of the marketplace. Contrary to critical theory, the state became more than an external entity shaping markets (e.g., through subsidies and tax credits) or socializing the costs of production (e.g., by paying for the training of labor and the development of technical knowledge) to benefit corporate capitalists.

Instead, some state actors and some university administrators and faculty became state subsidized entrepreneurs, initiating and engaging in post-structural forms of organization, by which we mean forms that do not fit easily into traditional structural categories, whether of functionalists or neo-marxists. The organizational forms surrounding commercial science differ from state capitalism as developed by populist states in the Progressive era in that they are neither natural monopolies, highly centralized, closely regulated, nor geared to any particular social justice goals. The organizational forms differ from universities' historical provision of services for a price, as was the case with assay offices, cooperative extension, health services, and the like, in that universities are product owners and seek to maximize profit. It is far from clear how these post-structural forms of organizations surrounding the commercialization of science will be integrated into the traditional university and the traditional state. In utilizing conventional structural categories that dichotomize "the state" and higher education, public and private, we miss the distinctiveness of the various arrangements that have emerged to facilitate technology transfer. We currently lack the language to adequately describe these organizational forms. However, at present, the forms can be described as being highly privileged, easily accruing state and institutional resources, and providing a powerful institutional dynamic, generating policies and regulations that have the potential to redefine the traditional terms of professional labor.

Our second research question asked how Arizona state statutes and policies relating to the commercialization of science defined the terms of academic labor. We found that the contract between the university and faculty engaged in commercial science became increasingly formalized and specified. In 1969, the contract between faculty and the University was relatively unspecified in terms of the commercialization of science. In University and Board policies, faculty had substantial ownership and reward claims on the intellectual property they produced, academic science was seen as the principal beneficiary of commercial science, and administrative control of the development and disposition of intellectual property was relatively minor. By the end of the 1980s, University and Board policies had eliminated the ownership claims of faculty and radically reduced their share of patent royalties, commercial science was justified in terms of the benefits it provided not just to academic science but to instructional services and the public interest. Faculty were subjected to a great deal more oversight and control of decisions surrounding commercialization activities. The terms of professional labor became such that faculty lost any claim to have their own time, and became salaried employees with all of their time and work owned by the employing organization.

Although the 1986 transfer of technology statute exempted faculty from conflict of interest restrictions that covered other state employees, the exemption provided for increased monitoring by administrators. Faculty were not defined as independent professionals, whose expanded expertise and increasingly valuable work strengthened their autonomy, as portrayed in the functionalist view. But neither were faculty a salaried class of servants to corporate capitalists, whose commercial science benefited corporate capitalists, as portrayed in the critical view.

Instead, Arizona faculty engaged in commercial science were simultaneously regulated more closely and valued and compensated more highly than other faculty. Other research that we have done on technology transfer at the University of Arizona suggests that even though faculty chafe under increased regulation, they are willing to accept closer monitoring to become state-subsidized entrepreneurs (Rhoades and Slaughter 1991; Rhoades and Slaughter 1991a; Slaughter and Rhoades 1990). As state-subsidized entrepreneurs, they are able to use public funds somewhat like private capital, building for-profit corporations or entering into partnerships with private companies to develop products based on their scientific discoveries. Those faculty engaged in university sponsored commercial science are able to act as entrepreneurs, even as they maintain their guaranteed state salaries, benefits, and infrastructural support, thereby avoiding the risks associated with entrepreneurship, specifically, and capitalism, generally.

Although faculty engaged in commercial science benefited from the rewritten contracts, the Regents emerged as the final authority. Yet, Board and university policies gave greater discretionary responsibilities to university central administrators. For example, the president and his/her staff were given powers to act like CEOs when they negotiated with private sector CEOs for product development or invested university resources in technology development. Despite the significant expansion of administrators' scope of action, there were no

provisions specifically addressing administrative accountability.

The state legislature and the Board of Regents became more involved in the commercialization of science by creating various statutes and policies. On the one hand, this could be read as state intrusion on institutional autonomy. But the state's actions gave the university, a state institution, more freedom to engage in commercial science activities and more control over employees who produced such science. To the extent that the state legislature and the Board of Regents created increasingly specified and formalized regulations for the University to follow, the University was given license to further develop its administrative capacity to fulfill such responsibilities, expanding the staffs and office, and legal and research infrastructures "necessary" to promote, prosecute, and protect commercial science activities and products. On the other hand, the changes in public policies could be read as the state enlisting public institutions in the service of corporate capital. However, the most immediate beneficiaries of the public policies were the institutional administrators and academics who took advantage of the options for administrative growth and state subsidized entrepreneurship. The public policies surrounding the commercialization of science sanctioned state involvement in and support of a new opportunity structure in the academy.

What do the rewritten contracts mean for the structure of work in the University? Most faculty are not engaged in commercial science activities, and are probably not aware of the statutes and policies. How, then, will the rewritten contract between Arizona universities and their faculty have any effect on the conditions of academic labor?

Contracts and statutes are legal tools that administrators use to shape the parameters of organizational action. Once these tools are officially inscribed in state codes and institutional policies, they can be used regularly, selectively, or can be drawn upon during times of crisis. For example, in the 1980s university administrators became more sophisticated in developing retrenchment policies and using the legal means available to them, avoiding declarations of institutional financial exigency, and instead restructuring programs as a justification for firing tenured faculty (Rhoades forthcoming; Slaughter forthcoming). Although most faculty were not aware of the ways administrators were using legal tools, they were largely unable to avoid dismissals in states such as Oregon, Maryland and California, as was the case with thousands of faculty in the 1970s (Slaughter 1981).

All faculty are subject to the rewritten policies and statutes regarding intellectual property. The rewritten terms of labor may seem to effect only those few faculty seeking to patent. However, the patent policies have actually become intellectual property policies, covering various forms of intellectual property, with the exception of books, though the inclusion of these was at one point considered in the policy deliberations (Rhoades and Slaughter 1991a). Moreover, in conjunction with the intellectual property policies, the university and board have rewritten related policies, such as conflict of interest and conflict of commitment policies. These policies pertain to all faculty. Similarly, policies regarding outside work have been rewritten. Just as faculty lost claim to "their own time" in the patent policies, so they have lost legal, although perhaps not practical, rights to one day a week for

consulting activities. Consulting policies impact a broad range of faculty. The point is that the patent policies are part of a broader process of redefining the terms of professional labor.

In themselves, the statutes and patent policies represent a change in the expectations that managers have of faculty. It is conceivable that in looking for ways to enhance productivity and revenues, managers would come to define commercially relevant research as part of some faculty's formal responsibilities (Slaughter 1985).

Perhaps more importantly, there is a hierarchy of privilege inscribed in the rewriting. Managers increase contractual controls over employee work that they regard as valuable. In addition, the promotion of commercial science in statutes and patent policies may point to patterns that will play out in the current restructuring of public universities, not only in terms of what structures are favored, but in the way that knowledge is constructed and organized in the academy – that is, around problems that are commercially relevant rather than around disciplines.

The ultimate effect of the rewritten statutes and policies may be to promote a distinctive strand of privatization in higher education. Some university administrators and some faculty may develop shared and permanent material and ideological interests rooted in privatized knowledge. The rewritten contracts may provide a rough map of future divisions within the academy that will develop – not just between academics and administrators, or among faculty by virtue of political and disciplinary differences (Clark 1987; Ladd and Lipset 1975), but among administrators and among faculty who are divided by whether or not they create, own and manage intellectual property (Slaughter forthcoming a). In other words, the rewritten statutes and contracts may exacerbate the gap between “haves” and “have-nots” in the academy, with the “haves” holding a position close to the market, and the “have-nots” far from the market (Slaughter forthcoming).

Academic professionals first emerged as a “new class” around 1900 (Bazon 1967). They were successful because they were able to insert themselves in the division created by the struggle between capital and labor, claiming to represent the public interest in the name of social reform and efficiency, even as they strongly pressed a self-serving agenda of professionalization (Bazon 1967; Perkin 1989). By 2000, the “new class” may be superseded by an institutional class (Slaughter 1990) that links some academics and some administrators in the public sector who command intellectual property with members of the private sector corporations engaged in production based on intellectual property in the pursuit of privilege, profit, and institutional class interest in the name of economic development.

Although privatization was initially a conservative agenda, the Clinton administration may well continue and even intensify ties between universities and the corporate sector under the auspices of an industrial or technology policy that will make America more competitive in global markets. We need to develop theories that enable us to understand such policies. To do so, we must move beyond dualistic theories that divide all organizations into public or private and all personnel in the academy into administrators or professionals. Such categories carry unnecessary connotations and cloud our perception of new organizational

forms and new patterns of professional stratification. Instead, we need to theorize relations between public and private sector, and between managers and professionals as fluid, permeable, changeable, and in some respects even undifferentiated. States, universities, professions, and private sectors, are more dynamic and multifaceted than our concepts and theories. Our data point to such complexity, and to the need for post-structural theorizing that will help us to better understand the relatively unmapped borderlands of so-called public and private sectors, the opportunity structures being created by state bodies that use public monies as venture capital for university start-up companies, and by state subsidized academic and administrative entrepreneurs. Certain organizational segments and actors in universities are more or less privileged by emerging industrial policies at the state and federal levels. Such policies will be defined in processes of executive, legislative, and organizational action, they will be tempered or tossed out in the long process of litigation, and they will be acted upon by administrators and faculty. Structuralist theories, functionalist and marxist alike, are ill-equipped to either explain the revised terms of professional labor and the emergent forms of university organization, or to answer the question of who pays for and who benefits from the current pattern of the commercialization of science.

Notes

1. In this paper, our interest is in public research universities. For this reason, and for reasons of space, we do not track changes in the policies of Arizona's other two public universities, or in the policies of community colleges in Arizona.
2. There is one addition in the policy that represents an important cautionary stance regarding conflicts of interest that might develop for individual faculty. "Notwithstanding any other provisions of this section, a grant, contract, or any other form of agreement between a university and any organization containing a provision assigning title is subject to final approval by the Board in the event a university employee has a material interest in the contracting organization or any entity engaged in a business relationship with the contracting organization." The policy is cautionary in addressing exchanges between state and for-profit organizations in which state employees have material interests and possible conflicts of interest of state. But it does not prohibit such exchange and involvement, it simply requires that the Board approve such situations.
3. The Income Distribution Policy developed by the university in response to the 1988 policy was also far more specified than earlier treatments of shares of the invention's proceeds. Not only were different shares specified for different levels of proceeds, but the policy identified different beneficiaries: inventor, inventor discretionary account (which is essentially the lab), intellectual property account (which is the university), Department, and Dean (the latter two of which receive quite minimal shares).
4. In each of the tables, NA means "not applicable."

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