

## COMMENTARY

# University Research and the Wages of Commerce

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### INTRODUCTION

On October 12, 1990, Ralph Nader gave a talk on "The Relationship Between the University and Business and Industry" as part of Wayne State's conference, *Ethics and the University*. The talk was vintage Nader, a loose argument supported by hundreds of particular details, presented without notes. The conclusion was a call to arms: Declining federal support of scientific research has tempted institutions of higher education (hereinafter "universities") to turn increasingly to business for help. Particular universities, even particular departments, have forged links with particular businesses. Business interests are taking over the university. The university will lose its soul unless it again becomes a place apart, a source of independent research and impartial judgment. The link between university and business must be broken once and for all.

I was one of two academics asked to respond. My response was not exactly a refutation; nor will this Commentary be. Nader has spotlighted an important problem. But he has, I believe, misunderstood it. He has not paid enough attention to its context. In context, the problem is more ambiguous than he makes it out to be, and better contained through innumerable small decisions than resolved once and for all. It is a problem for managers rather than for an Old Testament prophet.

University attorneys will be involved. They must approve many of the contracts by which universities and businesses create the links Nader fears. They also may help formulate general policies governing such links. University attorneys will need to distinguish clearly those links with business that universities ought to allow, or even encourage, from those the universities should discourage or forbid. This Commentary may provide a starting point for making such distinctions.

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I must begin with three admissions. The first is that I am affiliated with the Illinois Institute of Technology (IIT). Though now a university with a college of liberal arts, Ph.D. programs, a law school, and so on, IIT began as an engineering school and retains something of that spirit. Engineering schools exist to serve industry. They train chemical engineers for the chemical industry, automotive engineers for the auto industry, and so on. They also try to do research useful to industry and devote considerable time to helping industry make use of that research.

While IIT was conceived in what Nader must regard as sin and grew up committed to what Nader fears, I have not seen the effects that would justify his fears. True, IIT's research tends to the applied. Even our humanists pay much more attention to technology than do their counterparts at a liberal arts college. But, otherwise, IIT seems much like other universities with which I have been affiliated.

Engineering schools are not alone in their commitment to close links to business. Land-grant universities have a similar history. They were established to serve agriculture, the major industry of their day. From the beginning, they tried to do research useful to agriculture.

That is my first admission. The second is that I work at IIT's Center for the Study of Ethics in the Professions (hereinafter "the Ethics Center"). The Ethics Center was designed to link philosophers, social scientists, and other academics with society's professions.

Professions are practical activities, as inevitably linked to business in this society as human life is linked to the earth, air, and water of this blue planet. Some professions, like law or dentistry, are in fact carried on as businesses. Most members of those professions market their services. They differ from other business people only in formally committing themselves to serve the public in ways beyond what is required by law, market, and morality. Other professions, especially engineering, serve the public primarily through employment in large businesses. Still other professions—teaching or public administration, for example—though not directly engaged in business or employed by it, must regularly deal with business. Even government must get most of what it uses from "the private sector."

I am, then, institutionally committed to links between university and business. I also have benefitted personally from those links. While I am not an employee of any business, my links with business have served me in other ways. For example, these links have made it possible for me to interview engineers within large companies as part of a study of the ethical problems engineers face on the job.

So much for my second admission. My third explains how I came to be one of Nader's respondents. It too is relevant to gauging how much weight my response deserves. About five years ago, I was asked to serve as commentator for a panel at a meeting of the American Association for the Advancement of Science (AAAS). The panel's subject was the threat that business-supported research in biotechnology posed to the

integrity of the biological sciences within the university. Apart from being a philosopher, I had only two obvious qualifications for the assignment. One was that the panel's chair was the Ethics Center's director. The other qualification was that I had never before thought about the subject. My five co-panelists had already taken positions in articles or books. I was to offer a fresh perspective.

Before reading the papers, I undertook to do what philosophers generally do on such occasions, that is, to analyze the arguments, point out weaknesses, and attempt an overall assessment of the various positions. When I read the papers, I did so with increasing concern. Everything seemed to depend on one's understanding of what was going on in university departments and business laboratories.

I therefore decided to talk to some university researchers and business people directly involved (including my fellow panelists).<sup>1</sup> I did not do a scientific survey. I did not formulate questions in advance, keep notes of what was said, or choose informants in an orderly way. I simply collected points of view until I thought I understood the reality behind them. That reality turned out to be much more familiar than I had surmised from my initial immersion in the debate over university-business research links. Unfortunately, the AAAS panel did not provide an opportunity to report much of what I had learned. The Wayne State conference, however, did provide me with that opportunity. I was therefore grateful when, having heard what I might say, the conference organizers invited me to be one of Nader's respondents. This Commentary reports what I learned from my inquiries.

## I. WHAT BUSINESS CAN GET FROM THE UNIVERSITY

The business people I talked to generally identified three reasons for wanting to link up with university biology departments (including departments of biochemistry, biophysics, bioengineering, and so on): knowledge, students, and stimulation.<sup>2</sup> I shall discuss these in order.

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1. The AAAS invited all members of the panel to contribute their papers to a volume. Most did (with Sheldon Krinsky replacing Mark Lappé). The result was AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, COMMITTEE ON SCIENTIFIC FREEDOM AND RESPONSIBILITY, PART I BIOTECHNOLOGY: PROFESSIONAL ISSUES AND SOCIAL CONCERNS (P. DeForest, M. S. Frankel, J. S. Poindexter, V. Weil, eds. 1988). While all the papers are worth reading, the most relevant here are: MacCordy, *The Impact of Proprietary Arrangements on Universities*, 12-19; Price, *Bridging the Gap Between Academia and Industry: The Scientist's Role*, 20-27; and Beachy, *Reflections of an Industry-Supported University Scientist*, 28-33. My contribution to the volume (pp. 49-53) is a response to what the volume's other contributors wrote, not my response to what the other panelists said.

2. Notably missing from this list of reasons for wanting closer links with university researchers is access to equipment. Biotechnology companies may be unusual in this respect, but that was not a consideration they mentioned. The explanation does not seem to be that business research is better funded than university research. No one with experience in both fields made such a suggestion. What they did say suggests the following explanation: A company developing a particular technology is likely to have

Knowledge. Depending on the field and the journal involved, the time between scientific discovery and publication is between six months and two years. In many fields, even six months is now a long time to wait for information to be distributed. Those who depend on journals for information about their field will be forever behind those who depend on word of mouth, fax, electronic mail, or other informal means of communicating with those working at their field's developing edge.

This is at least as true in "applied science," including biotechnology, as in "pure science." Indeed, in many fields, the distinction between pure (or basic) research and research in applications is all but gone. Even abstract theory may have immediate applications, and many applications generate new theories.

A biotechnology company with close links to the appropriate biology department can gain a lead of anywhere from six months to two years over competitors who lack such links. That advantage need not be gained by excluding competitors, but rather by establishing links competitors also could establish, but, for one reason or another, do not. The advantage differs little from that which a company might gain by subscribing to journals another company does not. Because the advantage is primarily a function of convenience of communication, proximity is important. For that reason, companies tend to cluster around universities doing the appropriate research.

What, in principle, is the objection to close links between business and the appropriate university department, undertaken to achieve such competitive advantage? The competition involved seems to be in the public interest. The time a company saves by receiving information sooner through informal channels ultimately means that useful products should reach the market that much sooner, making our lives that much better. Public benefit should increase as competition forces companies one by one to copy the links competitors have with a particular department, either by developing similar links with that department or with a similar department. In the long run, even as the competitive advantage of links with the university tends to disappear, both the necessity of those links and the public benefit derived from them should continue to increase.

*Students.* The second reason biotechnology companies gave for wanting to link up with a particular biology department was access to graduate students. Biotechnology is not only a "science-driven" field; it is a field in which biologists (biochemists, and so on) are deeply

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many more researchers working in a small field than would a large biology department. Even if the amount spent on equipment per researcher were the same, therefore, the biotechnology company's aggregate fund for equipment suitable for that field would be greater than that available to a university. The biotechnology company would be more likely to have the full range of equipment needed for work in that small field, while having far less in the way of equipment needed for other fields, even those closely related but not part of its research plan. As in other respects, so with equipment, the university tends to be the generalist, and the business tends to be the specialist.

involved at every stage. In some biotechnology companies, even some large ones, nearly half the employees are Ph.D.'s. Such companies need Ph.D.'s in biology in the way the auto industry needs mechanical engineers. They want the best people they can get. They are more likely to recruit a Ph.D. who worked with them as a graduate student than one who did not. The companies therefore want their links with the university to include research involving the institution's graduate students. They view these links as analogous to those often established with universities as part of an undergraduate "co-op" program.

The business people I talked to believed students also benefitted from contact with them. Graduate students often arrive at an industrial laboratory sure that they will be dealing with people who care nothing for science, people whose academic insufficiency forced them out of the university into the world of dreary money-grubbing applications. What they find are scientists not so different from themselves, working under conditions not so different from those in the university. For the first time, taking a job in industry becomes an attractive possibility. The students now have an option they did not have before.

*Stimulation.* The third reason biotechnology companies gave for wanting close links with a university biology department was intellectual stimulation. Though researchers in the biotechnology business think of themselves as scientists much like those in biology departments, they are nonetheless aware of certain differences. Some of these differences resemble those that exist within a university between, say, a chemistry department and a department of chemical engineering. University researchers, being less concerned with application, tend to see particular problems against a broader horizon. Contact with university researchers helps to break down the tunnel vision that comes from working too long in a single direction or too close to a particular technology, something more likely to happen in an industrial laboratory than in a university laboratory.

Though some differences between university and business researchers have this benign origin, others do not. Businesses and universities differ in their use of information. For business, knowledge is primarily a source of wealth rather than academic reputation. To produce wealth, knowledge must be controlled in ways it need not be to gain reputation. In order to pursue wealth, businesses tend to be more secretive about research than universities. Business research tends to be discussed freely only within the company (or within a unit of the company). University researchers, on the other hand, generally move in a wider world, talking as freely with researchers at other institutions as with those down the hall.<sup>3</sup>

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3. The problem of secrecy, however, is not unknown even within the university. Some university researchers do classified research. Such researchers, especially those working within separate laboratories under contract with the Department of Defense, may

Even within a business, however, secrecy tends to impede the free communication on which science and engineering thrive. One benefit that businesses may derive from profitable links with a university department is an argument to keep controls on information within the company to a minimum. Since university researchers tend to resist secrecy on principle, businesses learn to allow more open communication or lose valuable university contributions.

## II. WHAT THE UNIVERSITY CAN GET FROM BUSINESS

The few university administrators I talked to either were willing to do whatever the "research community" wanted or talked primarily as researchers rather than as administrators. While pleased with the income generated by research, university representatives did not initiate links between university and business. Individual university researchers (or research groups) typically initiated the research relationship. These researchers generally identified three reasons for their links with business: placement, technology, and stimulation.<sup>4</sup>

*Placement.* Since the late 1960s, placing Ph.D.'s in university positions has become increasingly difficult, even in relatively hot fields like biotechnology. A department that cannot place its graduates will eventually find itself with fewer graduate students. Fewer graduate students would mean less university support, more undergraduate teaching, fewer colleagues, older equipment, and, eventually, less in-

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work under conditions more secretive than those under which the ordinary scientist in business works. Such university researchers tend to be cut off from other university researchers. While they may benefit from hearing what other researchers are doing, they can freely discuss their own work only with those having the appropriate government clearance. They cannot engage in the usual give-and-take of academic science.

Most university researchers tend to view those among them doing classified research as outside the academic community, even when the work is conducted in the next lab. For that reason (among others), universities generally have discouraged classified research on campus. When universities have allowed such research, they have usually tried to make the research as open as possible. By settling in advance what results will be publishable and how long publication can be delayed, for example, universities have tried to prevent the intellectual isolation that secrecy within the university tends to generate.

4. Notably absent from this list of reasons is money, a reason which Nader stressed. The university researchers I talked to suggested three reasons why money as such is not important. First, money is primarily a means of getting equipment and supporting students. Money thus is implicit in the first two reasons they listed. Second, they thought that biotechnology companies generally wanted to link up with the best biology departments, that is, those whose researchers were also most likely to win government grants. Links with business did not so much increase their research support as change its source and, with its source, the arguments necessary to justify it. Third, and perhaps most surprising, most biotechnology companies did not seem to have vast pools of money to invest in new research. Getting money out of a company was at least as hard as getting it out of the government. Indeed, the major difference between the two was that getting money out of a company was a much more personal affair, with memos, phone conversations, and meetings often taking the place of a formal application.

teresting research. Faculty, therefore, have a substantial interest in the quality of the employment of their Ph.D.'s. Today, many Ph.D.'s work in industry. A faculty member's close links with a particular biotechnology company may enhance a student's chances of receiving permanent employment with that company after graduation. Instead of a rushed courtship during the few months before graduation, the student can spend two or three years working beside the company's researchers, giving both the company and the student adequate time to make a full assessment of each other. This is especially important for students who are more impressive in a laboratory than in an interview.

*Technology.* Basic research in biotechnology depends heavily on developments in business applications. Certain research, for example, may require inserting biological material into a cell. Procedures for producing large amounts of that material, and "vectors" for inserting the material into the cell, are as likely to be developed in the laboratory of a biotechnology company as in a university laboratory. A university scientist closely linked to the right company may be able to get the necessary procedures or vectors more quickly than without such links. Such "inside information" may save several years of work for the scientist. That a particular university researcher will benefit from the work of a certain biotechnology company is today relatively easy to predict. If the researcher works with the same organism that the company uses, the researcher may benefit from the company's resources. The company is likely to have (or be developing) equipment, procedures, or materials the researcher will find useful, and that otherwise might be unavailable. Because the research is related to the company's work, the researcher may also have a bargaining tool. Collaboration, therefore, is likely to benefit both the researcher and the company. In return for being allowed to monitor a researcher's progress (that is, to see research before publication), the company may agree to alert the researcher to commercial developments, provide new products at cost, and otherwise assist the research.

*Stimulation.* Those opposed to university-business research links worry about the redirection of university research that such links produce ("warping of the research agenda"). The worry is not baseless. Even university researchers with close links to business agree that their research should be determined by the probability of scientifically interesting discoveries, not the profit that it might generate. They also agree that greed sometimes leads university researchers to seek profit rather than knowledge. Nonetheless, they thought that their links with business were defensible.

Proponents of university-business research did not justify their links with business simply by the access to technology or the placement of graduate students. Those benefits, though substantial, were not enough to justify the risk of being drawn into research having no inherent scientific interest. They were sure that, if necessary, they could find

ways to obtain much of the same technology and student placement while distancing themselves from business. The one benefit they did not think they could otherwise obtain was the intellectual stimulation available from working closely with business researchers on particular projects.

At first, this claim appears suspicious. How convenient! They knew that working with business had changed their research. Why not ascribe the change to intellectual stimulation rather than to the warping effect of excessive concern with marketing?

There are nonetheless at least two reasons to take the claim of intellectual stimulation seriously, one is empirical. The researchers not only claimed to be more productive scientists as a result of their links with business, they provided anecdotal evidence. The researchers related stories of how their work with business called attention to possibilities they might have overlooked otherwise. And anecdotes are not the only empirical evidence for their claim. Statistical evidence is also persuasive. One survey reports that "faculty . . . who were receiving industry support tended to publish more, patent more, earn more, serve in more administrative roles, and teach as much as faculty without industry funds."<sup>5</sup>

The second reason I accepted the claim that business research relations stimulated intellectual creativity was that I had experienced something similar. I initially studied applied ethics as an adjunct to teaching courses in that field. These courses, from the outside, may have looked like "pandering to the student market." Over the years, however, as I attempted to apply my theoretical views to the practical questions on which such courses focus, I found my theoretical views changing. Much that made sense in the abstract turned out to be nonsense in practice. As my sense of moral practice changed, others, including some dyed-in-the-wool theorists, found my views on ethics growing more interesting. My publication rate improved substantially.<sup>6</sup>

We should take university researchers at their word, therefore, when they claim they benefit intellectually from working closely with researchers in business (at least until their publications tell us otherwise). Once we accept that claim, we can see why Nader's call to break all links between university and business must be rejected. Some of those links are paying for themselves in scientific knowledge, the one coin every university should honor.

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5. Blumenthal, Gluck, Louis, Sotto, Wise, *University-Industry Research Relationships in Biotechnology: Implications for the University*, 232 *SCIENCE* 1361, 1364 (June 13, 1986).

6. I am not the only philosopher who thinks applied ethics has done much for theory (and for philosophy generally). See, e.g., Toulmin, *How Medicine Saved the Life of Ethics*, 25 *PERSPECTIVES IN BIOLOGY AND MEDICINE* 736-750 (Summer 1982); see also Davis, *The Ethics Boom: What and Why*, 24 *CENTENNIAL REVIEW* 163-186 (Spring 1990).



## CONCLUSION: WHAT'S TO WORRY?

I do not wish to sound too cheerful about research links between universities and businesses. Like Nader, I think those links can endanger a university's soul. I differ from Nader only in denying that the danger is inherent in most links between university and business.

Universities are places not only of learning, places where the learned congregate; they are as well, and indeed primarily, places for learning, whether by discovery or by being taught. The university will not lose its soul so long as its links with business serve learning. The question, then, is which links between university and business are likely to serve learning and which are not. Those links likely to interfere with learning should be forbidden or, where that is impossible, discouraged.

I shall conclude this Commentary by pointing out three links between university and business that can endanger learning. While the list could be lengthened, three dangers suffice to make my general point.

One danger comes from within the university itself. This danger arises from university researchers who want to get rich and will stay at the university only if university policies make such enrichment possible. For example, some researchers want to benefit personally from the patents for which they receive credit. They want to use university facilities, including graduate students, to work on projects from which they will, they hope, eventually make money for themselves. University policy should be designed to encourage such researchers to go elsewhere. University officials could require, for example, that all patents developed in university facilities become the property of the university. The university might then put the income from patents back into research. This requirement could be structured so that the money would go back into research in the particular researcher's laboratory, without personally enriching the researcher.

Why discourage the greedy in this way? The university, unlike the market, is a place where riches are (or, at least, should be) suspect. The rewards the university offers include the pleasure of learning something new; the fellowship of those who value knowledge for itself (or for the public good); and (ultimately) the honor of doing something for knowledge that the fellowship considers important. University researchers sometimes become rich, as do professors who write textbooks. But those who want riches should go into business, not as researchers,<sup>7</sup> but as entrepreneurs, or holders of equity, who may go broke in the market instead of growing rich. The university should not go out of its way to make room for those whose purposes are alien. University researchers who seek personal profit when they are supposed to discover and teach are enemies to universities.

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7. Researchers in business, like university researchers, are frequently required to sign an agreement to give the employer all property rights to discoveries made during employment.

A second danger is the possibility that researchers' scientific judgments will be clouded by the profit motive. For example, I know of a professor who, in partial payment for overseeing FDA-required testing of a new drug, was to receive stock options in the company producing the drug. The options would have been worth nothing unless the test turned out positive.

While lawyers have long been sensitive to conflict of interest, scientists only recently have begun to think in such terms. Universities need to provide policies for identifying potential conflicts, for avoiding those that can be avoided, and for disclosing to interested parties those that cannot (or need not) be avoided. Though the government has begun to force universities to formulate policies on conflicts of interest relevant to government-supported research, universities probably should go well beyond what is required by law.<sup>8</sup>

The third danger concerns control of information that the university produces for business or receives from business. A university exists to teach what its faculty knows. Secrecy, however justified outside the university, is inconsistent with that commitment to spreading knowledge. Classified or proprietary research may be excused, especially if the secrecy covers only a small part of a research plan, is of brief duration, or is confined to laboratories separated from the university campus. But a university should view even excusable arrangements with distrust. Such arrangements should never become so normal that the income they generate becomes sufficient to justify them.

This list of dangers may sound surprisingly like Nader's. Yet, it follows from what I suggested justifies many of the links Nader condemns. The stimulation that both business and university researchers cite as the one advantage that cannot be achieved except by close links between them, presupposes important differences between them. So, for example, a university researcher would not be nearly as likely to bring a new perspective to a problem on which a business researcher has been working if the university researcher were as concerned with marketable applications as is the business researcher. Similarly, a business researcher is not nearly as likely to stimulate ideas for new lines of research in a university researcher who has been thinking like a business researcher all along. If what makes the university useful to business depends on such differences, the long-term interests of business (as well as of the university) are in preserving those differences. University-business links, therefore, should not endanger the fundamental difference between university and business.

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8. Here, discussion of links between university and business merges into the wider field of research ethics. For a survey of that field, see Davis, *The New World of Research Ethics: A Preliminary Map*, 5 *INTERNATIONAL JOURNAL OF APPLIED PHILOSOPHY* 1-10 (Spring 1990). For some strategies for dealing with these problems, see Davis, *The Discipline of Science: Law or Profession?*, 1 *ACCOUNTABILITY IN RESEARCH* 137-145 (Fall 1990).