

**Is science for sale? : transferring technology from universities to foreign corporations : twenty-eighth report / by the Committee on Government Operations, together with separate and additional views.**

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IS SCIENCE FOR SALE?:  
TRANSFERRING TECHNOLOGY FROM  
UNIVERSITIES TO FOREIGN CORPORATIONS

## TWENTY-EIGHTH REPORT

BY THE

COMMITTEE ON GOVERNMENT  
OPERATIONS

together with

## SEPARATE AND ADDITIONAL VIEWS



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## LETTER OF TRANSMITTAL

HOUSE OF REPRESENTATIVES,  
Washington, DC, October 16, 1992.

Hon. THOMAS S. FOLEY,  
*Speaker of the House of Representatives,*  
Washington, DC.

DEAR MR. SPEAKER: By direction of the Committee on Government Operations, I submit herewith the committee's twenty-eighth report to the 102d Congress. The committee's report is based on a study made by its Human Resources and Intergovernmental Relations Subcommittee.

JOHN CONYERS, Jr., *Chairman.*

(III)

VIEWS

Approved and sent by the House of Representatives

Attest: Clerk of the House, Thomas M. Pappas

LETTER OF TRANSMITTAL

Hon. THOMAS S. FLOWERS  
Speaker of the House of Representatives  
Washington, DC

Dear Mr. Speaker: In recognition of the Committee on Government Operations I submit herewith the committee's report on the study made by its Human Resources and Intergovernmental Relations Subcommittee on the subject of the "Human Resources and Intergovernmental Relations Study".

Very truly yours,  
JOHN CONYERS, JR.  
Chairman

Approved and transmitted for the Committee on Government Operations  
this 1st day of May, 1974.

JOHN CONYERS, JR.  
Chairman

Approved and transmitted for the Committee on Government Operations  
this 1st day of May, 1974.

JOHN CONYERS, JR.  
Chairman

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# IS SCIENCE FOR SALE?: TRANSFERRING TECHNOLOGY FROM UNIVERSITIES TO FOREIGN CORPORATIONS

OCTOBER 16, 1992.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. CONYERS, from the Committee on Government Operations,  
submitted the following

## TWENTY-EIGHTH REPORT

together with

### SEPARATE AND ADDITIONAL VIEWS

BASED ON A STUDY BY THE HUMAN RESOURCES AND  
INTERGOVERNMENTAL RELATIONS SUBCOMMITTEE

On October 1, 1992, the Committee on Government Operations approved and adopted a report entitled "Is Science for Sale?: Transferring Technology from Universities to Foreign Corporations." The chairman was directed to transmit a copy to the Speaker of the House.

#### I. INTRODUCTION

Under the rules of the House of Representatives Rule X, 2(b)(2), the Committee on Government Operations is authorized to "review and study, on a continuing basis, the operation of Government activities at all levels with a view to determining their economy and efficiency." The committee has assigned this responsibility, as it pertains to the National Institutes of Health [NIH] and the National Science Foundation [NSF] to the Human Resources and Intergovernmental Relations Subcommittee.

Pursuant to its authority, the subcommittee conducted an investigation of the processes by which U.S. universities that receive research funding from the NIH and the NSF transfer those scientific results to private companies, including foreign corporations.



The old vision of the university as an "ivory tower," removed from all worldly concerns, belongs more to myth than reality. However, universities have traditionally placed greater emphasis on basic science and a relatively pure pursuit of knowledge, rather than practical applications of scientific discoveries.<sup>1</sup> In fact, the goals of academia were seen as antithetical to those of industry; for example, in 1982, the president of Yale University, Bartlett Giamatti, wrote an article in *Science* magazine describing "the academic imperative to seek knowledge objectively and share it openly and freely; and the industrial imperative to garner a profit, which creates the incentives to treat knowledge as private property."<sup>2</sup>

During the 1980's, there was a dramatic shift among academic scientists to work more closely with industry,<sup>3</sup> partly as a result of Federal legislation designed to speed the transfer of ideas from academia to the marketplace.<sup>4</sup> Closer ties between university researchers and the private sector were encouraged; the goal was to speed the commercialization of new technologies to ensure that the rich intellectual resources developed within our universities would contribute to U.S. economic competitiveness.<sup>5</sup> However, those closer ties have also brought conflicts of interest, where faculty and universities may have a financial interest in the outcome of federally funded research or in the application of the research results by industry. Policy makers therefore need to determine the extent to which research that has been paid for with taxpayers' money should benefit the public, when the public interest conflicts with the university's financial interests or the individual researcher's financial interests.

On June 13, 1989, the subcommittee conducted a hearing on the sale of federally funded research results to foreign companies. This hearing included testimony by Dr. James Wyngaarden, Director of the National Institutes of Health, who was accompanied by Dr. William Raub, Deputy Director, Dr. Katherine Bick, Deputy Director for Extramural Research, and Dr. Earleen Elkins, Science Administrator; and Erich Bloch, Director of the National Science Foundation, accompanied by Charles Herz, general counsel, and Robert Andersen, deputy general counsel. Other witnesses included Dr. George Lundberg, editor, *Journal of the American Medical Association*; Dr. David Noble, professor, Drexel University; Dr. Patricia Woolf, Princeton University; Dr. Sheldon Krinsky, chairman, Committee on Scientific Freedom and Responsibility of the American Association for the Advancement of Science; Dr. David Blumenthal, senior vice president of Brigham and Women's Hospital;

<sup>1</sup> See, for example, Dickson, D. (1984). "The New Politics of Science," New York: Pantheon Books; and Krinsky, S. (1988). University entrepreneurship and the public purpose, in "Biotechnology: Professional Issues and Social Concerns," DeForest, Paul, et al., Washington, DC: American Association for the Advancement of Science.

<sup>2</sup> Krinsky, S. Op. cit., p. 34.

<sup>3</sup> Ibid.

<sup>4</sup> The Stevenson-Wydler and Bayh-Dole Acts authorized Government agencies to grant commercial licenses (now codified within Federal patent law, title 35 of the United States Code). Regulations governing patent licenses are published in title 37 of the Code of Federal Regulations, part 404.

<sup>5</sup> Schacht, W.H. (Feb. 26, 1992). "Technology Transfer: Use of Federally Funded Research and Development," Congressional Research Service [CRS], Issue Brief 85031; and (Feb. 27, 1992) "Industrial Competitiveness and Technological Advancement: Debate over Government Policy," CRS Issue Brief 91132.



and Paul Gray, president of the Massachusetts Institute of Technology.

## II. BACKGROUND

### A. LEGISLATIVE INITIATIVES

There was considerable legislative activity aimed at fostering technology transfer in the 1980's. For example, in 1980, the Stevenson-Wydler Technology Innovation Act (Public Law 96-480) mandated that "the Federal Government shall strive where appropriate to transfer federally owned or originated technology to State and local governments and to the private sector." The law created mechanisms by which Federal agencies and their laboratories could transfer technology.<sup>6</sup>

Amendments to the patent and trademark laws, commonly called the Bayh-Dole Act (Public Law 96-517), enacted in 1980, were designed to foster interaction between academia and the business community. Under this law, universities could license their inventions arising from Federal grants to the private sector, as long as commercialization was required to take place in a timely fashion. The law was expected to create financial incentives that would encourage universities to license to industry, where the technology can be manufactured or used. There were restrictions: Certain rights to the patent are reserved for the Government, and these organizations are required to commercialize within a predetermined and agreed upon timeframe.<sup>7</sup>

Tax laws were also modified in an attempt to encourage industry/university cooperation. Title II of the Economic Recovery Tax Act of 1981 (Public Law 97-34) provided a 25 percent tax credit for 65 percent of all company payments to universities for the performance of basic research. Companies were also permitted a larger tax deduction for charitable contributions of equipment used in scientific research at academic institutions. The Tax Reform Act of 1986 (Public Law 99-514) kept this latter provision, but reduced the tax credit for university basic research.

The National Cooperative Research Act (Public Law 98-462), enacted in 1984, was designed to encourage companies to undertake joint research. This legislation clarifies the antitrust laws and requires the "rule of reason" standard be applied to determine violations of these laws: Cooperative research ventures are not to be judged illegal "per se." It also eliminated treble damage awards for those research ventures found in violation of the antitrust laws if prior disclosure (as defined in the law) has been made.<sup>8</sup>

The Federal Technology Transfer Act (Public Law 99-502), which became law in 1986, encouraged Federal laboratories to work cooperatively with industry and universities. It established incentives for Federal laboratory employees to promote the commercialization of the results of federally funded research and development. The law amends the Stevenson-Wydler Technology Innovation Act to

<sup>6</sup>Schacht, W.H. CRS Issue Brief 85031, op. cit., p. 6.

<sup>7</sup>Schacht, W.H. CRS Issue Brief 91132, op. cit., pp. 7-8.

<sup>8</sup>The bill also included provisions aimed at discouraging frivolous litigation against joint research ventures without simultaneously discouraging suits of plaintiffs with valid claims. See Schacht, W.H. CRS Issue Brief 91132, p. 8.



allow cooperative research and development agreements between Government-owned, Government-operated laboratories and universities or the private sector. In addition, certain agencies were mandated to create a cash awards program and a royalty sharing activity for Federal scientists, engineers, and technicians, in recognition of efforts toward commercializing technology.<sup>9</sup>

Most recently, the Department of Defense fiscal year 1990 Authorization Act (Public Law 101-189) extended the authority to form Cooperative Research and Development Agreements [CRADA's] to foster collaboration between governmental agencies and commercial firms.

The universities responded to these Federal incentives by increasing their emphasis on technology transfer during the last decade, as was expected. Of the 35 universities with the largest NIH and NSF grants, 34 now have a technology licensing office, compared to 22 before 1980.<sup>10</sup> This reflects increased licensing activities; for example, Harvard University, which granted its first license in December 1980, granted 39 licenses in fiscal year 1990.<sup>11</sup>

#### B. INDUSTRIAL LIAISON PROGRAMS

One of the ways that universities responded to these legislative efforts was by creating academic *industrial liaison programs* [ILP's]. For a fee, a university ILP provides corporations with facilitated access to virtually all university researchers and their research data, often before those data are published in scientific journals. In addition to personalized advice about faculty who have expertise of interest to the ILP member company, seminars, symposia, and short courses are offered to member companies, in order to provide them with information about research being conducted by faculty associated with the ILP.<sup>12</sup>

A 1988 General Accounting Office [GAO] report, "R&D Funding: Foreign Sponsorship of University Research," found that, of 107 U.S. universities surveyed, 41 had ILP's.<sup>13</sup> Some universities had separate ILP's in different departments, so each university was asked to identify its three largest ILP's; of these, 70 percent had been created since 1980. Approximately 3,000 U.S. companies participate in these programs.<sup>14</sup> GAO found that the majority of ILP members were U.S. corporations, but 15 percent were foreign.

ILP's were created by universities in order to benefit the participating universities, not just to benefit the private sector or to improve technology transfer. Professors and graduate students gain experiences that provide insight into industrial needs and inter-

<sup>9</sup> Ibid., CRS Issue Brief 91132, p. 9.

<sup>10</sup> "University Research: Controlling Inappropriate Access to Federally Funded Research Results" (May 1992), GAO/RCED-92-104, p. 3. This report will hereafter be referred to as "University Research," 1992 GAO report.

<sup>11</sup> Ibid.

<sup>12</sup> "R&D Funding: Foreign Sponsorship of U.S. University Research," GAO/RCED-88-89BR General Accounting Office report; "Research at MIT 1988-89 ILP Directory," reprinted in Hearing before a subcommittee of the Committee on Government Operations, House of Representatives, "Is Science for Sale?: Conflicts of Interest vs. the Public Interest," June 13, 1989, hereafter referred to as Hearing, pp. 155-159.

<sup>13</sup> Ibid., p. 20.

<sup>14</sup> "Report of the NSB Committee on Foreign Involvement in U.S. Universities" (1989). Washington, DC: National Science Foundation/National Science Board.



ests.<sup>15</sup> Personal ties may develop over time, sometimes evolving into contract research and/or special research agreements which bring in significant sums of money to the university.<sup>16</sup> In addition, the membership fees that are paid to the university can exceed the costs of the program by several million dollars.

The participation of foreign companies in programs that provide access to federally funded research raises policy questions about the intent of Federal research and development programs. For example, should the intellectual fruits of federally funded research be offered equally to companies that do not support that research through their tax contributions? Is the U.S. academic research base, built up over many decades of public investment, being tapped by foreign entities that have not contributed to that investment?

### C. CONGRESSIONAL AND GAO STUDIES

In 1989, the Human Resources and Intergovernmental Relations Subcommittee held a hearing that focused on one of the oldest and largest ILP's in the country, at the Massachusetts Institute of Technology [MIT].<sup>17</sup> As a followup to that hearing, during 1989-91, the subcommittee conducted a survey of 52 other universities that had been reported to have ILP's; these included many of the top research universities in the United States.<sup>18</sup> In addition, in 1990, the subcommittee requested that the General Accounting Office conduct a study of technology transfer from institutions that receive the largest NSF and NIH grants and contracts, to determine the extent to which federally funded research is being used by domestic and foreign companies. This report will focus on the information provided by the subcommittee hearing, the subcommittee survey, and the GAO report, but will also include additional information from the subcommittee investigation.

As a part of the subcommittee survey, each of the universities was asked if it had "at least one industrial liaison program or equivalent through which companies can meet with faculty and

<sup>15</sup>For example, a faculty study group on the international relations of MIT concluded that faculty visits to industrial sites "serve as a channel for knowledge transfer to and from industry, and provide faculty members with insights into industrial problems." The visits are "often considered by the faculty to be a valuable vehicle for staying abreast of advanced industrial research." "The International Relationships of MIT in a Technologically Competitive World," faculty study group, appointed by the MIT provost, on the international relations of MIT, May 1, 1991, p. 33. See also Hearing, testimony of Paul Gray, president of MIT, p. 102.

<sup>16</sup>Ibid.

<sup>17</sup>Hearing before a subcommittee of the Committee on Government Operations, House of Representatives, "Is Science for Sale?: Conflicts of Interest vs. the Public Interest," June 13, 1989, hereafter referred to as Hearing.

<sup>18</sup>The programs here considered to be ILP's may, in some cases, also provide direct sponsorship of research, but the survey focused on programs that exchange information only. The universities participating in the subcommittee study included: Brown, California Institute of Technology, University of California at Los Angeles, University of California at San Diego, Carnegie Mellon University, University of Cincinnati, Columbia University, University of Connecticut, Cornell, University of Delaware, Drexel University, Georgia Tech, University of Illinois at Urbana-Champaign, University of Iowa, Iowa State, University of Maryland at College Park, University of Massachusetts at Amherst, University of Michigan, New York University, University of North Carolina at Chapel Hill, North Carolina State, Northwestern, University of Oklahoma, Penn State, Rutgers, University of South Carolina, University of Southern California, Southern Illinois University at Carbondale, Stanford, University of Tennessee at Knoxville, University of Texas at Austin, Texas A&M, Thomas Jefferson University, University of Utah, Vanderbilt, Virginia Tech, University of Washington, University of Wisconsin at Madison, Woods Hole Oceanographic Institution, and Yale. Only universities believed to have functioning ILP's were contacted.



have access to research results by paying a fee." The universities were asked to provide the name of each program, the number of member companies, the number of foreign member companies, and the annual fees paid by corporate members.

In their 1992 report, the GAO surveyed 37 universities that were among the 25 leading university recipients of funding from NIH and/or the 25 leading university recipients of funding from NSF in fiscal year 1989.<sup>19</sup> All the universities except Baylor College of Medicine and the University of Pennsylvania responded to the questionnaire.<sup>20</sup>

### III. FINDINGS

#### A. INDUSTRIAL LIAISON PROGRAMS PROVIDE PRIVATE COMPANIES WITH ACCESS TO FEDERALLY FUNDED RESEARCH BEFORE SUCH INFORMATION IS WIDELY AVAILABLE

There are no national surveys of how frequently companies obtain *exclusive* information about the results of federally funded research through ILP programs. However, the subcommittee survey and the 1992 GAO report found that virtually all programs provide advance access to results that have not yet been published when such information is requested by ILP members.<sup>21</sup> In some cases, that information may be available through preprints that are available to anyone upon request; nevertheless, the ILP members might be the only companies who would know that such a preprint existed and could be requested. In other cases, faculty may decide to make preprints available only to ILP members, or even a specific ILP member.

The benefits of this advance information for companies would vary, depending on how many get the information, and the amount of time that elapsed between the time the information is made available to specific ILP members and the time that the information is published. In some cases years could elapse, if the author has not yet submitted the manuscript for publication, if the author has difficulty finding a journal that accepts the manuscript for publication, or if a journal has accepted a manuscript but delays publishing it for several months or even years because of publication delays. In his congressional testimony, the president of MIT argued that preprints are widely available in the academic community, and publication delays range from several weeks to 1 year;<sup>22</sup> however, scientists have notified the subcommittee that the availability of nonpublished information varies according to the field of study, and from individual to individual, and the publication lag may also be several years, depending on the journal.<sup>23</sup> The value of these preprints is recognized by MIT's ILP, in that MIT rewards faculty who provide preprints to the ILP office with "points" that

<sup>19</sup> "University Research," 1992 GAO report, p. 33.

<sup>20</sup> Ibid.

<sup>21</sup> For example, GAO found that all 30 universities with ILP programs provide advance access, although 12 (40 percent) reported that such access was limited to "preprints," which are manuscripts that have not yet been published, but may have been submitted for publication. See "University Research," 1992 GAO report, p. 17.

<sup>22</sup> Hearing, testimony of Paul Gray, president of MIT, p. 144.

<sup>23</sup> Relevant documents are in subcommittee files.



can be used to pay for office furniture, travel expenses, and other amenities.

#### B. MANY FOREIGN CORPORATIONS GAIN EXCLUSIVE ACCESS TO FEDERALLY FUNDED RESEARCH FINDINGS AT MAJOR UNIVERSITIES

In their 1992 report, GAO found that "technologies developed in whole or in part with NIH or NSF funding accounted for about 35 percent of all licenses granted" and 73 percent of all license income received by the 35 universities they studied during fiscal year 1989-90.<sup>24</sup> Of the 197 exclusive licenses that were granted from these Federal funds, 18 (9 percent) were foreign companies, 11 (6 percent) were U.S. subsidiaries of foreign companies, and 168 recipients were organizations with U.S. headquarters or foreign subsidiaries of U.S. companies.<sup>25</sup>

American universities receive approximately \$6 billion for research projects from NIH and NSF every year, and the 35 universities that GAO studied receive more than half of that total.<sup>26</sup> Thirty of these universities had ILP programs, and 24 of the 30 had at least one foreign member; however, the GAO did not determine whether licenses were granted to ILP members.<sup>27</sup>

#### C. INDUSTRIAL LIAISON PROGRAMS HELP FOREIGN COMPANIES GAIN SUBSTANTIAL ACCESS TO FEDERALLY FUNDED RESEARCH RESULTS

The subcommittee's detailed examination of MIT's ILP illustrates how a well-established ILP program may provide foreign companies with access to federally funded research that is even greater than the proportion of foreign ILP members would suggest. The subcommittee focused on MIT's program both because of the size of its ILP, and because it receives such a large share of the annual Federal investment in research. For example, MIT received almost \$500 million for research in 1988, 86 percent of which was from the Federal Government.<sup>28</sup>

MIT's ILP was established in 1948 to raise money for research and to "encourage the transfer of knowledge to industry."<sup>29</sup> The program contributes \$3 million to the MIT budget each year and generates approximately \$8 million overall.<sup>30</sup> It is described as a public/private partnership whereby the university acts as a match-maker between MIT faculty and interested corporations. For approximately \$30,000-\$50,000 per year, 250-300 U.S. and foreign corporations enroll and thereby gain almost unlimited access to faculty and research results.<sup>31</sup>

MIT officials claim that the goals of the ILP are to help companies gain access to university expertise, to improve products and production techniques by providing industry with "a window through which to view the developments of technological research

<sup>24</sup> "University Research," 1992 GAO report, pp. 3, 12.

<sup>25</sup> "University Research," 1992 GAO report, p. 14.

<sup>26</sup> Document in subcommittee files.

<sup>27</sup> "University Research," 1992 GAO report, p. 17.

<sup>28</sup> 1988 statistics were published in the 1988-89 MIT ILP catalog, in subcommittee files.

<sup>29</sup> "The International Relationships of MIT in a Technologically Competitive World," faculty study group, appointed by the MIT provost, on the international relations of MIT, May 1, 1991, p.32.

<sup>30</sup> Ibid.

<sup>31</sup> Ibid., p. 33-34. A small number of members pay less than \$30,000 or more than \$50,000.



in fields of interest to them.”<sup>32</sup> In congressional testimony in 1985, the president of MIT, Paul Gray, cited the ILP as an example of a university/industry partnership that will help improve U.S. competitiveness “through the quicker and more effective application of the fruits of research to industrial operations. . . . Thus stronger relationships that bridge between U.S. industry and basic research can be seen as matters of national interest to be encouraged and fostered by Congress.”<sup>33</sup>

However, according to information provided by the ILP program and participating faculty members, most of the ILP contacts at MIT are between faculty and foreign corporate representatives, often with Japanese competitors of U.S. companies.<sup>34</sup> In other words, at MIT, federally-funded know-how is made available more often to foreign than to U.S. corporations. Moreover, it may be made available before it is published or otherwise made public.

*MIT's ties with foreign companies.*—MIT provided the subcommittee with a list of 337 faculty who had contacts with companies through the ILP between 1984–88 and who also received at least \$100,000 in NIH or NSF grants during that time. The contacts were listed by number and company. While 55 percent of the corporate members of the ILP were U.S. companies, most contacts were with foreign companies. More recently, the percentage of U.S. companies in the ILP has dropped, to just over 50 percent.<sup>35</sup>

*Benefits to Foreign vs U.S. Companies.*—Documents supplied by MIT indicate that most of the faculty ILP participants who received more than \$1 million dollars in NIH or NSF grant funds had extensive contact with foreign companies and limited contact with U.S. companies through the ILP.<sup>36</sup> The subcommittee focused on the “top 10” faculty members: Those with both the largest Federal grants and the most substantial ILP contacts.

Each of these 10 researchers received between \$3.1 and \$9.3 million from the Federal Government over 5 years. Eight (80 percent) had more contacts with foreign than with U.S. corporations. The faculty reported that ILP contacts consisted primarily of discussions of their NSF or NIH research. Of the substantial contacts, only one-third were with U.S. companies while 30 percent were with Japanese companies and 36 percent were with other foreign companies.<sup>37</sup> Similarly, of the “top 25” MIT faculty grantees, each

<sup>32</sup> Hearing before a subcommittee of the Committee on Science and Technology, House of Representatives, “Technology Transfer,” May 21, 22, 1985; reprinted in Hearing, pp. 231–233.

<sup>33</sup> Ibid.

<sup>34</sup> These documents are in subcommittee files.

<sup>35</sup> “The International Relationships of MIT in a Technologically Competitive World,” faculty study group, appointed by the MIT provost, on the international relations of MIT, May 1, 1991, p. 33.

<sup>36</sup> It should be noted that the president of MIT claimed that contacts with domestic companies are frequently made outside of the ILP and so would not be noticed in our study. He explained that some U.S. companies do not feel that it is “worth it” to join the ILP when they can access faculty know-how simply by picking up the telephone.

<sup>37</sup> MIT gave points to faculty for participation in the ILP program, ranging from 1 point for sending a scientific article to the ILP office before it is published, talking by telephone to a corporate representative for 2 points, meeting with a corporate representative on campus for at least 2 points, and traveling to the corporation, which was worth at least 12 points, depending on location. For the purposes of this analysis, the subcommittee defined “substantial” contacts as totaling eight points or more, since that would usually represent several meetings or conversations.



of whom received more than \$1 million in Federal grants and had substantial ILP contacts, 80 percent had more contacts with foreign than with U.S. corporations.

The subcommittee survey did not evaluate the specific technologies developed as a result of MIT's ILP. However, there is evidence that federally funded research can contribute to the success of foreign companies. For example, U.S. companies first developed the semiconductor, integrated circuit, and microprocessor, and dominated the international market for computers.<sup>38</sup> However, a Japanese company, NEC, had become the world leader in production of microprocessors and semiconductors by 1985, and according to *Business Week*, the NEC Corporation chairman credited "access to MIT research for much of NEC's success in computers."<sup>39</sup>

As part of the subcommittee survey, staff contacted several U.S. companies to ask about ILP participation. Company officials stated that U.S. corporate emphasis on short-term (quarterly) gains limits their ability and willingness to invest in basic research because payoff times can be as long as a decade.<sup>40</sup> For this reason, ILP programs are relatively cost effective. Some of the companies interviewed expressed concerns about foreign participation in ILP's, especially if the information was not yet published in the scientific literature. They expressed even more concern about direct foreign investment in academic research, which was perceived as more likely to result in exclusive rights to licensing.

#### D. INDUSTRIAL LIAISON PROGRAMS VARY IN THE INCENTIVES PROVIDED TO DOMESTIC AND FOREIGN COMPANIES TO INCREASE PARTICIPATION

One criticism about foreign participation in ILP's is that U.S. companies pay twice for access to research results: First, as taxpayers that are funding Federal research, and second, by paying any ILP membership fees. In contrast, foreign companies do not pay taxes to support Federal research, and only pay the relatively modest membership fees.

University administrators that defend contacts with foreign companies through ILP's have claimed that foreign corporations more actively pursue information from ILP programs than do domestic corporations. For example, Richard Cyert, the president of Carnegie Mellon, told the *Chronicle of Higher Education* that, "I do not feel that American firms are responsive enough, and I don't believe we can get the kind of support we want and need strictly from American firms."<sup>41</sup> In the same article, the director of MIT's ILP is quoted as saying, "American industry doesn't have the habit built in to take advantage of knowledge that is created elsewhere."

However, some university industrial liaison programs discourage participation of foreign companies compared to domestic participation, while others actively pursue the participation of foreign companies. For example, GAO reports that since 1988, the engineering ILP at Berkeley has usually charged foreign companies twice the

<sup>38</sup> Noble, D. (1989). The multinational university, "Zeta," p. 21; in subcommittee files.

<sup>39</sup> Ibid. NEC was also in second place in the production of integrated circuits.

<sup>40</sup> Documents in subcommittee files.

<sup>41</sup> Jaschik, S. Frustrated by tepid response of U.S. business, Carnegie Mellon says it will encourage Japanese links to its federally funded research, *Chronicle of Higher Education*, July 9, 1989, pp. A14, A22.



membership fee compared to U.S. companies.<sup>42</sup> In contrast, MIT has actively pursued foreign ILP members; an ILP office was opened in Tokyo in the mid-1970's, and another is being considered for Europe.<sup>43</sup> Although no other universities have reported foreign ILP offices, the University of California at Berkeley and Carnegie Mellon have both opened offices in Tokyo for fundraising and other activities.<sup>44</sup>

*MIT incentives for assisting foreign companies.*—Any MIT faculty member can earn "points" for participation in the ILP. For example, sending a scientific article to the ILP office before it is published is worth 1 point; talking by phone to a corporate representative is worth 2 points; meeting with a corporate representative on campus is worth at least 2 points, depending on the length of the visit; and traveling to the corporation is worth at least 12 points, depending on distance and inconvenience. In 1989, each point was worth \$35 towards professional travel, office furniture, equipment, secretarial assistance, and other amenities. Several large NIH or NSF faculty grantees received more than 100 points during the few years preceding the subcommittee hearing in 1989.<sup>45</sup>

Because faculty receive more points for visiting companies that are far away from campus, MIT's ILP provides an incentive system that encourages contacts with foreign companies more than contacts with domestic companies. For example, several faculty told the subcommittee that their ILP-related trips to Asia and Europe helped pay for travel that they wanted to do, such as an international conference in China or Europe.<sup>46</sup> Consulting at a foreign company was worth at least \$420 in travel funds, and could be worth three times that amount. Hotels and local transportation for MIT faculty are all paid by the company while on ILP business.

MIT officials have publicly claimed that foreign companies pay higher ILP membership fees than domestic companies. However, MIT has provided documents to the subcommittee indicating that in fiscal year 1989, no Japanese companies paid more than \$44,300 for membership, whereas 14 United States companies paid fees ranging from \$45,000–70,000.<sup>47</sup> Similarly, from 1984–1986, American companies were paying a maximum annual fee of \$50,000, whereas Japanese companies were paying a maximum of only \$30,000. Although MIT claimed that they had a sliding fee scale whereby fees were to be larger for the largest companies, the Japanese companies paying only \$30,000 in 1985 or 1986 included several major, well known corporations such as Fuji Photo, Cannon, Inc., Shiseido, and Nippon Steel Corporation.<sup>48</sup>

In contrast to MIT and other universities that actively seek foreign members, ILP's at several major universities informed GAO that they had no foreign members, including University of Chicago, University of Colorado, Duke University, and Michigan State.<sup>49</sup>

<sup>42</sup> "University Research," 1992 GAO report, p. 19.

<sup>43</sup> *Ibid.*, p. 34–35.

<sup>44</sup> Epstein, S. (1991). "Buying the American Mind: Japan's Quest for U.S. Ideas in Science, Economic Policy, and the Schools." Washington, DC: Center for Public Integrity, p. 7.

<sup>45</sup> Documents regarding the points received by faculty are in subcommittee files.

<sup>46</sup> These documents are in subcommittee files.

<sup>47</sup> Document in subcommittee files.

<sup>48</sup> These documents are in subcommittee files.

<sup>49</sup> "University Research," 1992 GAO report, p. 18.



Moreover, several universities reported that their ILP's had restrictions on foreign members' access to information. For example, Columbia University reported that its Columbia Forum in Japan, which coordinates contacts with Japanese biomedical companies, is limited to technologies that are already publicly reported and not claimed by U.S. companies. The University of Michigan reported that one of its ILP's limited foreign participation to basic research only. The University of Wisconsin reported at least one ILP limits access by Japanese companies unless technology of equal value is exchanged.<sup>50</sup>

Even when there are no restrictions on membership, membership will be strongly influenced by marketing efforts. For example, a private company, BEST North America, which is affiliated with Johns Hopkins University, provides ILP-type services by offering a data base including information about thousands of U.S. faculty members to corporate subscribers. Members are from North America, Australia, and Europe; although membership is open to companies from all countries, marketing efforts have been limited to North America and Europe.<sup>51</sup>

#### E. FOREIGN MEMBERS RANGE FROM 0-50 PERCENT AT MAJOR UNIVERSITY INDUSTRIAL LIAISON PROGRAMS

Although private investment in academic research has grown dramatically in real dollars since 1980, universities and colleges received \$9.6 billion from the Federal Government, compared to \$1.1 billion from businesses in fiscal year 1990.<sup>52</sup>

Fifty-one universities responded to the subcommittee survey in 1989-90. Ten had no ILP's at the time of the survey. A total of 41 universities had at least one ILP each, and most had more; the number of liaison programs ranged as high as 34, typically associated with different departments or disciplines within departments.<sup>53</sup> The total number of member companies at a university's ILP's ranged from 4 to 426. The 41 universities with ILP's had an average of 89 member companies.<sup>54</sup> On average, 10 of those 89 companies were foreign, although five of the universities had moderate to large ILP's with no foreign members.<sup>55</sup> Foreign ILP membership ranged between 0-50 percent, but averaged 14 percent. Fees ranged from \$750 to as high as \$200,000, but most were between \$10,000 and \$30,000. The schools included private and public institutions, varying in size, with a wide range of foreign ILP participation.

Institutions conducting more research tended to have more active ILP's. Of the 41 universities with ILP's, 31 (76 percent) were designated research I schools by the Carnegie classification system; this classification indicates that they are considered the best research institutions in the country.<sup>56</sup>

<sup>50</sup> Ibid., p. 19.

<sup>51</sup> Documents describing this program are in subcommittee files.

<sup>52</sup> "University Research," 1992 GAO report, p. 1.

<sup>53</sup> MIT was not included in the analysis, since its program was analyzed separately. The inclusion of MIT would have increased the number and proportion of foreign members.

<sup>54</sup> This number is based on the number of members of all ILP programs at an individual institution. Some institutions had one ILP program; others had two or more programs, sometimes in different departments.

<sup>55</sup> These 10 included 4 research I and 1 research II schools who had no foreign members in their ILP's despite an average of 38 company members each.

<sup>56</sup> Two of the 41 schools did not have a Carnegie classification.



Universities that had more member companies in their ILP programs, or more foreign members, tended to receive more industry sponsored research funds. For example, the 15 universities with the highest number of ILP members (ranging from 82 to 426) averaged an annual research investment from industry of \$15,757,000, whereas the remaining 26 universities averaged only \$6,583,000. This difference is consistent with a major goal of ILP programs, which is to establish personal contacts between faculty and industry representatives in the hope of attracting direct research investment dollars.

The findings from the 1992 GAO report were similar to the subcommittee findings. Of the 30 major Federal grant recipients that had ILP's that charged fees, 24 had at least one foreign member, and their total foreign membership was 499 companies.<sup>57</sup> Three of the universities had 290 (58 percent) of the foreign members: They are MIT, Stanford, and the University of California at Berkeley.<sup>58</sup> Although the three universities reported to GAO that they did not provide advance access to research results except through manuscripts that were not yet published, that claim was inconsistent with information provided by faculty at MIT, who described discussions of research at the early stages of work, long before publication was imminent.<sup>59</sup>

#### F. PUBLIC INSTITUTIONS WITH INDUSTRIAL LIAISON PROGRAMS HAVE SIMILAR FOREIGN MEMBERSHIP TO THOSE IN PRIVATE UNIVERSITIES

Of the 41 schools with ILP's that were surveyed by the subcommittee, public schools averaged a similar number of ILP member companies compared to private schools. Private research institutions had a slightly greater number of foreign member companies. Fourteen of the 20 universities with the most ILP member companies were public schools (70 percent), while of the 21 universities with the fewest member companies, 12 were public (57 percent).

Of the 41 schools in the subcommittee survey, 26 of the 31 research I schools had relatively large ILP's, with 20 or more member companies. Among these highly research-oriented schools with significant ILP activity, the three with the greatest proportion of foreign participation, in addition to MIT, were all private schools: Stanford, Columbia, and Carnegie Mellon, with 25, 24 and 23 percent foreign participation respectively. Of the schools with more than 20 member companies, the next highest foreign participation was found at Pennsylvania State University (17 percent), a public school. The remaining institutions are a mixture of public and private universities, all with foreign participation near or below the overall average. Notable among these were the University of California at Berkeley and North Carolina State University, each with large ILP's and 14 percent foreign participation, which is average for the group as a whole.

Three public universities have very large ILP's, with more than 100 member companies, and negligible foreign participation (1 to 2

<sup>57</sup> "University Research," 1992 GAO report, p. 17. Since some companies may have belonged to more than one university ILP, the total number of companies may be smaller.

<sup>58</sup> Ibid.

<sup>59</sup> Documents in subcommittee files.



percent). These include the University of Michigan, Texas A&M, and the University of Washington.

Two public universities that are not major research institutions had very high foreign participation in their ILP programs: The University of Delaware and the University of South Carolina at Columbia. Both are considered research II schools within the Carnegie classification. Each had moderately sized ILP's with just under 50 industry members; 29 percent and 25 percent of the members, respectively, were foreign companies.

ILP programs essentially charge fees for access to research information that has traditionally been free for American businesses. For example, the subcommittee received testimony from Dr. Arthur Kelman, a senior research professor at the University of Wisconsin and member of the National Academy of Sciences, describing the tradition of faculty at public land grant universities providing advice to growers and industries related to agriculture without receiving any payment.<sup>60</sup> According to Dr. Kelman:

We often do research and experiments in direct response to specific requests for assistance in the solution of a problem. This system has been in place for many years and has been highly effective inasmuch as the personal contacts established insure a free-flow of information. Thus, efficient transfer of agricultural technology and its application has resulted in raising productivity and efficiency of agriculture to a level in the U.S.A. that has been the envy of the world.<sup>61</sup>

#### G. MIT HAS INCREASED FOREIGN PARTICIPATION IN ITS INDUSTRIAL LIAISON PROGRAM, DESPITE PUBLIC CRITICISM

In response to concerns raised by this subcommittee and the media, a faculty study group was formed at MIT to advise the administration and faculty on the "general principles and policies that should guide MIT's international activities and relationships, with particular reference to economic implications."<sup>62</sup> This group concluded that in the resolution of conflicts between national and international roles of MIT, "the [MIT] Administration, with the advice of the Faculty, should give primary weight to [MIT's] responsibility to the nation."<sup>63</sup> The report admitted, however, that as of March 1991, there were 245 corporate members, of which 121 were foreign (57 Japanese, 56 European, and 8 from elsewhere). This represents an increased percentage of foreign participation from 45 percent to 49 percent compared to 1989.

In their 1991 report, MIT claims that faculty have five times as many contacts with U.S. firms outside the ILP as through the

<sup>60</sup> Land grant institutions consist of 69 colleges and universities which received Federal land under the Morrill Act of 1862; the land was sold to provide a permanent endowment for at least one college in each State. Each college was required to include courses in agriculture and the mechanical arts "in order to promote the liberal and practical education of the industrial classes."

<sup>61</sup> In Hearing, letter from Dr. Kelman to the Hon. Ted Weiss, June 9, 1989, p. 164.

<sup>62</sup> Faculty study group on the international relations of MIT, appointed by the provost. This group issued recommendations on May 1, 1991. The summary is in subcommittee files.

<sup>63</sup> Ibid.



ILP.<sup>64</sup> MIT suggests that U.S. firms are simply more likely to telephone faculty members without the need of an ILP to facilitate access. However, they have not provided evidence to back up this assertion.

The report concluded further:

We considered whether the ILP on balance may now have become a liability because of the attention resulting from foreign membership. The value of the ILP to the faculty as a vehicle for staying abreast of industrial research, the Program's usefulness in raising resources, and the fact that faculty contacts with foreign industry through the ILP are only a small portion of their contacts with American industry, argue strongly in favor of the program and give no grounds for recommending reevaluation. In fact, we strongly encourage the development of additional participation by U.S. firms to increase the interaction between MIT research and American industry.

On similar grounds, we see no basis for establishing a limit on the proportion of foreign-based companies in the ILP nor for restricting the provision of services based on nationality.<sup>65</sup>

Despite documented evidence obtained by the subcommittee indicating that MIT has charged less to foreign companies than American companies, the report concluded that:

Differential fees for foreign companies are a more appropriate means of reflecting the benefits of access to U.S. investments in science and technology. We recommend that the Administration continue its present policy of charging higher fees to foreign firms.

It may be that MIT currently charges foreign companies more than U.S. companies of similar size, but the university has not admitted that it charged U.S. companies more in the 1980's, and has provided the subcommittee with no evidence that the ILP now charges less.

The MIT report's claims that foreign companies do not derive significant benefits from the university's programs, similar to those made by then-president Paul Gray at the subcommittee hearing, are inconsistent with documented evidence of extensive contacts between foreign companies and MIT faculty with the largest Federal grants. In addition, former president Gray recently received one of Japan's highest honors, the Imperial Decoration, Grand Cordon of the Order of the Sacred Treasure, for his efforts to promote friendly relations and mutual understanding between the United States and Japan.<sup>66</sup> Two other MIT officials also received similar honors from the Emperor of Japan.<sup>67</sup>

<sup>64</sup> "The International Relationships of MIT in a Technologically Competitive World," faculty study group, appointed by the MIT provost, on the international relations of MIT, May 1, 1991, p. 33.

<sup>65</sup> The report summary is in subcommittee files.

<sup>66</sup> "Tech Talk," June 17, 1992, and July 15, 1992; in subcommittee files.

<sup>67</sup> Ibid.



#### H. DIRECT FUNDING OF UNIVERSITY RESEARCH PROJECTS BY FOREIGN COMPANIES ALSO EXPLOITS FEDERALLY FUNDED RESEARCH

Industrial liaison programs are not the only public/private academic partnerships that may involve comingling of Federal funds and funds from private industry. During the last few years, there have been several cooperative ventures whereby a private, foreign company makes a substantial investment in research activities at an American research institution.

For example, in 1989, Shiseido, a Japanese cosmetics firm, negotiated a research agreement with Harvard, pledging \$85 million, to be paid over 10 years, to establish the Harvard Cutaneous Biology Research Center at Massachusetts General Hospital. The agreement adds 35 new research positions to the 50 full-time professors on the dermatology department faculty, and gives the hospital patent rights on all research findings, in exchange for giving Shiseido first rights to an exclusive license to develop, manufacture, and sell any resulting commercial products in any market the company selects.<sup>68</sup>

In 1990, the University of California at Irvine announced the opening of the \$16.5 million Hitachi Chemical Research Center. The center was built and equipped with Hitachi funds on land provided for free by the university.<sup>69</sup> The first floor is used by university researchers, and Hitachi employees have access to those facilities, whereas the top two floors are occupied by Hitachi Chemical and are off limits to university employees. The university has the right to patent all discoveries that university faculty are involved in, but Hitachi has the first right to license these discoveries.

If these partnerships did not involve Federal grants, there would be less concern on the part of Congress. However, faculty and administrators at the institutions have publicly stated that they expect Federal research dollars would be used to expand upon the research efforts, and they have apparently been successful. For example, the director of the research center funded by Shiseido received an NIH research grant in fiscal year 1990.<sup>70</sup>

#### I. INVESTMENTS BY UNIVERSITIES CAN CREATE CONFLICTS OF INTEREST IN TECHNOLOGY TRANSFER TO FOREIGN OR DOMESTIC COMPANIES

Most universities hold stock in a variety of companies as part of their investment portfolio. In some cases, these include companies that are members of their industrial liaison program. For example, MIT held stock in several companies, foreign and domestic, that were members.<sup>71</sup> This creates potential conflicts of interest, since the value of the stock could be influenced by patent rights to important new technologies, including those developed by federally funded faculty at the university.

<sup>68</sup> Epstein, S. "Buying the American Mind," *op. cit.*, p. 9; Sun, M. (Aug. 25, 1989). Shiseido grant: More than skin deep, *Science*, pp. 810-811.

<sup>69</sup> *Ibid.*, pp. 10-11.

<sup>70</sup> "Research Grants, FY 1990 Funds," NIH, U.S. Department of Health and Human Services; in subcommittee files.

<sup>71</sup> These include Hitachi, NEC Corporation, Fuji Photo, Toyota, Ciba-Geigy, and Canon, Inc. Information about stockholdings is published in MIT's annual 'Report of the Treasurer.'



The 35 universities surveyed by GAO reported that scientists who developed the federally funded technologies for 61 exclusive licenses "consulted for, owned a substantial amount of stock in, or had other relationships with the licensees" and "members of industrial liaison programs were granted exclusive licenses in four cases."<sup>72</sup> In 12 additional cases, GAO found that companies that had long-term research agreements with universities received exclusive licenses for technology they did not directly cosponsor. In 17 cases, the licensee was a startup company in which the university accepted stock.<sup>73</sup>

#### J. INDUSTRY PRIORITIES MAY CONFLICT WITH ACADEMIC PRIORITIES

As the president of Yale pointed out in 1982, a company's need for exclusive rights to a patent can conflict with the academic ethos that research results should be communicated openly and submitted promptly for publication.<sup>74</sup> According to the National Research Council, investigators should, within a reasonable amount of time, share data, samples, and other materials created or gathered in the course of research.<sup>75</sup> At the same time, researchers are urged to make their innovations and inventions widely useful and usable for the public good. Unfortunately, these guidelines may come into direct conflict with a competitive industry's need to protect intellectual property.

### IV. CONCLUSIONS AND RECOMMENDATIONS

#### A. CONGRESS SHOULD ENSURE THAT RESEARCH FUNDED BY U.S. TAXPAYERS WILL BENEFIT THOSE TAXPAYERS WHENEVER POSSIBLE

In the last decade, despite a growing concern with the Federal deficit, Federal funds for social programs have decreased, while research funding has increased over the rate of inflation. Research dollars have received strong congressional support in part because Congress believed testimony like that of MIT's then-president, Paul Gray, that such funds are crucial to keep U.S. companies more competitive.

While technology transfer in and of itself may benefit society, American taxpayers will generally benefit more when American companies are involved, rather than foreign ones.

Although ILP's may merely facilitate the transfer of information to a wide range of companies, ILP's represent a significant source of information transfer from academia to industry which may be of concern when the information was derived from Federal funds. When universities establish incentive systems that encourage faculty to spend time with ILP members, this will tend to encourage faculty, who are already busy with their teaching and research, to spend less time with representatives of companies that are not ILP members. When universities charge lower ILP membership fees to foreign companies compared to domestic companies, that is espe-

<sup>72</sup> "University Research," 1992 GAO report, p. 3.

<sup>73</sup> Ibid, p. 16.

<sup>74</sup> Krinsky, S. op. cit.

<sup>75</sup> Fineberg, S.E., Martin, M.E., & Straf, M.L. (Eds.) (1985). "Sharing Research Data," Washington, DC: National Academy Press.



cially unfair, but even if the membership fees are comparable, domestic companies will pay more by virtue of the fact that their tax dollars pay for the research, and they are then expected to pay a fee for access to the research.

The main concerns are that the benefits of publicly funded research are being sold at bargain basement prices to foreign corporations, and that the very programs that were initiated to increase U.S. competitiveness are benefiting our economic competitors instead. Results of the surveys conducted by the subcommittee and GAO indicate that although this problem is not currently widespread, there is a tendency for the largest Federal grantees to share their technology, sometimes on an exclusive basis, with foreign companies. Such activities are not illegal, and there are currently no safeguards against them.

In response to congressional criticism, MIT and other institutions have considered increasing the fees charged to foreign companies that join ILP's. However, even if ILP's were to charge substantially higher membership fees to foreign companies compared to domestic companies, this would not address the major issue of whether research funded by American taxpayers should be sold to foreign companies to improve their competitiveness.

In their 1992 report, GAO recommended that "NIH and NSF develop policies that address the extent to which U.S. and foreign industrial liaison program members can be given advance access to research the agencies have funded." We agree. At the very least, HHS and NSF should develop regulations that provide incentives that more strongly encourage grantee institutions to improve their ties with domestic corporations and use their resources in other ways that benefit American taxpayers.

**B. HHS AND NSF SHOULD GIVE PREFERENCE TO GRANT APPLICANTS WHO ARE LIKELY TO ENCOURAGE THE APPLICATION OF THEIR RESEARCH RESULTS, AND CONGRESS SHOULD ENSURE THAT AMERICAN COMPANIES HAVE PREFERENTIAL TREATMENT IN ACCESS TO FEDERALLY FUNDED RESEARCH RESULTS**

At the university level, there is increased pressure to work with private industry. Applied research is now encouraged because it brings funds to the university. Federal grants or industry grants will usually help fulfill the requirements for promotion and tenure. At the same time, the departments that bring in more outside money also benefit from larger buildings, better equipment, more staff, and so on.

In addition, researchers who receive honoraria and consulting fees from private companies are examples to other faculty of how to succeed financially and academically. At many universities, if an academic researcher wants to travel all over the country and the world as an invited speaker, it is necessary to build friendly relations with private companies that will support extensive travel. ILP's may provide incentives that favor faculty relationships with foreign companies, thus providing a role model for success that is not in the best interest of American competitiveness.

Despite the frequent rhetoric about the importance of technology transfer, there are few grant programs within HHS or NSF that



explicitly specify that preference will be given to applicants who have plans for how to find practical applications for their research results. Such a preference would not always be desirable, but when it is, such preference should be explicitly part of the peer review process. In addition, HHS and NSF should promulgate regulations that require grantees to give preference to technology transfer to American companies in the granting of licenses to patents. Grantees should be permitted to grant exclusive licenses to a foreign company only if no American companies are interested.

**C. UNIVERSITIES SHOULD BE REQUIRED, BY STATUTE OR REGULATION, TO DISCLOSE ALL LINKS TO PRIVATE COMPANIES IN GRANT PROPOSALS AND DISCLOSE IN REPORTS WHETHER ANY FOREIGN COMPANIES USE THEIR RESEARCH RESULTS**

HHS and NSF should promulgate regulations that require grant applicants and contractors to disclose all financial relationships or other relevant relationships to private companies when they apply for Federal funds. This should include information about whether the company is foreign, domestic, a foreign subsidiary of a domestic company, and so on. Relationships with foreign companies would not preclude Federal funding, but the Federal agencies should take that information into account when funding decisions are made.

Similarly, financial relationships with private companies that develop after funding decisions are made should also be disclosed to the NSF and HHS as soon as they occur, and in all reports based on the funded research.

If the agencies do not develop satisfactory regulations in the near future, Congress should require such regulations by statute.

**D. INSTITUTIONS RECEIVING HHS AND NSF FUNDS SHOULD BE REQUIRED TO DISCLOSE INVESTMENTS IN COMPANIES THAT MAY BENEFIT FROM THOSE FUNDS, PARTICULARLY FOREIGN COMPANIES**

The subcommittee findings and the GAO report indicate that universities sometimes invest in companies that could benefit from the federally funded research conducted at their institution. HHS expressed concerns about these institutional conflicts of interest in a recent draft of their proposed conflict of interest policy, which stated:

The PHS is concerned about the possibility that large gifts to an institution from, and large investments of the institution in, biomedical businesses may appear to be in conflict with the objective conduct of research. There is concern about situations in which the outcome of a research project at an institution may have a significant effect on the value of the financial holdings of the institution or the support of the institution through gifts from a commercial enterprise. The PHS requests the institutions to consider the potential conflicts of interest of the financial interests of the institution with the objective conduct of PHS supported research in the development of institutional policies on financial interest. It should be made clear in the policy of each institution that the conduct of research at the institution will in no way be influenced by



past, current, and anticipated relationships between the institution and any commercial enterprise.<sup>76</sup>

Despite this strongly expressed concern, the proposed rule *requests* but does not *require* the institutions applying for funding to "consider" these conflicts of interest. Instead, HHS and NSF should *require* that these conflicts of interest be disclosed when institutions apply for Federal funds.

The question about conflicts of interest have been raised in many different areas of scientific research. In the field of biotechnology, the National Science Foundation (NSF) has been particularly active. In 1980, NSF issued a report entitled "Conflicts of Interest in the Biomedical Sciences" which was a response to a request from the House of Representatives. The report was a result of a study conducted by the National Academy of Sciences (NAS) and the National Research Council (NRC). The report found that conflicts of interest were a significant problem in the biomedical sciences and that they could be a major barrier to the advancement of science. The report recommended that the federal government should take steps to address these conflicts of interest. One of the key recommendations was that the federal government should require researchers to disclose any potential conflicts of interest. This recommendation was based on the fact that conflicts of interest could lead to biased research and that they could be a major barrier to the advancement of science. The report also recommended that the federal government should take steps to ensure that researchers are able to conduct their research without any potential conflicts of interest. This recommendation was based on the fact that conflicts of interest could lead to biased research and that they could be a major barrier to the advancement of science. The report also recommended that the federal government should take steps to ensure that researchers are able to conduct their research without any potential conflicts of interest. This recommendation was based on the fact that conflicts of interest could lead to biased research and that they could be a major barrier to the advancement of science.

<sup>76</sup> May 28, 1992 draft entitled "Responsibilities of Public Health Service [PHS] Funded Institutions for Promoting Objectivity in Research"; in subcommittee files.



## SEPARATE VIEWS OF HON. CRAIG THOMAS

In an effort to encourage more technology transfer and the exchange of basic research between universities and corporations, Congress changed a series of laws dealing with patent and trademark protection, technology transfer, and antitrust statutes.<sup>1</sup> These changes were designed to create a more cooperative environment between the Government, universities and the private sector. The intended goal of these efforts was to increase the productivity of domestic companies.

The subcommittee hearing, the GAO reports, and this subcommittee report deal with two separate issues—the issues of conflicts of interest and the access of foreign companies to research generated at U.S. universities. Each is worthy of consideration.

### CONFLICT OF INTEREST

The questions about conflicts of interest have been raised in many different areas of medicine, science, and technology. In its May 1992 report entitled "University Research: Controlling Inappropriate Access to Federally Funded Research Results"<sup>2</sup> (hereinafter referred to as "University Research"), a GAO survey indicated that 14 of the 35 universities studied relied upon "voluntary disclosure" of potential conflicts of interest by members of their communities. However, 21 of the 35 universities require disclosure, including MIT.<sup>3</sup> The GAO report also cited "scientists who developed the technologies for 61 exclusive licenses consulted for, owned a substantial amount of stock in, or had other relationships with the licensees."<sup>4</sup>

In a research environment, conflicts are bound to arise. As Dr. George Lundberg of the American Medical Association stated during the hearing, "Conflicts of interest are rife. They're terribly complicated, and they're shades of gray of every sort. So it's a question of how important a conflict of interest is that needs to be worked out."<sup>5</sup> The final recommendation of the report states that the Federal Government should require the disclosure of all conflicts and potential conflicts when applying for Federal grants. While this is a laudable goal in theory, it may be more difficult to place into practice.

Working relationships between the private sector, universities, and researchers have produced numerous advancements that have

<sup>1</sup>The examples cited in this report include the "Bayh-Dole Act" (Public Law 96-517); "Economic Recovery Tax Act of 1981" (Public Law 97-34); "Tax Reform Act of 1986" (Public Law 99-514); "National Cooperative Research Act" (Public Law 98-462); "Federal Technology Transfer Act" (Public Law 99-502).

<sup>2</sup>GAO/RCED-92-104.

<sup>3</sup>Ibid., pp. 21-22.

<sup>4</sup>Ibid., p. 3.

<sup>5</sup>Hearing record at p. 82.



saved lives and dollars. We should be working to preserve these arrangements whenever possible. But conflicts of interest—even the appearance of a possible conflict—can undermine confidence in the quality of the research, the technology, and the final product. This fact cannot and should not be ignored. The prior disclosure of fiduciary agreements is the obvious way to address this problem.

The Federal Government should play a role in trying to encourage such disclosure, but Federal “requirements” could mean increased regulation and mandates. This could hinder the future release of grants, prevent some of our brightest minds from participating in important research, and prevent or reduce the transfer of needed research and technology to domestic and foreign corporations. We should work toward the goal of full disclosure, but not at the cost of lost results. Our universities need to work with their research faculty, and professional organizations such as the American Medical Association have begun implementing their own policies. Any Federal role in this process should be with the clear intent of protecting taxpayer dollars, not reducing or eliminating the transfer of important research and technology.

#### FOREIGN CORPORATE ACCESS TO RESEARCH

The second issue in this report is the access of foreign corporations to research generated at our universities, research that is funded with the use of Federal tax dollars. This issue presupposes that the transfer of technology to foreign corporations is not beneficial to this country, something that is difficult to prove or disprove.

In 1988, the General Accounting Office conducted a survey of 107 universities and found that 41 had Industrial Liaison Programs [ILP's].<sup>6</sup> An ILP is a system that allows access to university-sponsored research prior to public dissemination. A university would compile a list of all ongoing and completed research by its professors, and make that list available to companies or individuals willing to pay a set fee to the university. It is a program designed to provide revenues to university research programs in need of funding. It provides a forum for researchers by guaranteeing access to the private sector. It provides corporations the opportunity to obtain new technology and research at a fraction of the cost of developing inhouse programs. According to figures cited in this report, approximately 3,000 U.S. companies participate in this program, but 15 percent of the participants were foreign corporations.

On June 13, 1989, the Human Resources and Intergovernmental Relations Subcommittee conducted a hearing to examine the sale of federally funded research to foreign companies. The program at the Massachusetts Institute of Technology was used as the example at the hearing. Companies would pay a fee of \$20,000 to \$70,000 to have access to a publication detailing all ongoing research projects. University professors were encouraged to participate in this program through a “points” system, with each point having an approximate value of \$35. These points were given in lieu of cash,

<sup>6</sup>GAO/RCED-88-89BR General Accounting Office report, “R&D Funding: Foreign Sponsorship of U.S. University Research.”



and allowed them to purchase computers and equipment, office furniture, or travel to conferences.

The MIT program did encourage foreign participation in their ILP, particularly Japanese participation. Dr. Paul Gray, the president of the university, discussed the percentages of participation by European, Japanese, and domestic companies. According to Dr. Gray, all companies had access to these researchers regardless of whether they participated in the ILP. Any company president could "just pick up the phone" and make contacts. These contacts were not credited to the point system of the ILP, and distorted the actual participation figures.<sup>7</sup>

Some of the majority's findings about access to the MIT program were backed up by testimony. It is apparent that the school was aware of the level of foreign interest in their work, and efforts were made to facilitate the access to this information (including the opening of an MIT ILP office in Tokyo, and reduced participation costs). Although the GAO report did discuss the programs at other schools, the 1989 hearing did not go into great detail as to how similar programs are working at other universities. Although mentioned in the hearing record, the GAO report, and this report, more detailed information could have demonstrated a more even-handed approach at other schools.

This report gives little weight to Dr. Gray's argument that any company, foreign or domestic, could access this information regardless of whether they were participants in the program. If the subcommittee were engaging in a more thorough discussion of this issue, a discussion that may be warranted, it would have to examine the transfer of *all* technology and the entire ILP program, not simply focus on one specific program at one specific school.

The majority also failed to recognize how U.S. law and university practices protected domestic companies. In his testimony, Dr. Gray stated that "95 percent" of MIT's licenses go to U.S. companies in accordance with those laws and practices.<sup>8</sup> The majority does state, correctly, that this figure includes defense contracts. This somewhat skews the numbers toward domestic as opposed to foreign licensing. It would be helpful to analyze in more detail the entire record of the MIT program from its inception to the present, with an emphasis on the defense versus nondefense percentages at that school.

The report does cite the findings printed in the "University Research" report which broke down the allocation of 197 exclusive licenses granted in fiscal years 1989 and 1990. According to GAO, 85 percent of these licenses were granted to organizations headquartered in the United States, or foreign subsidiaries of U.S. corporations. Another 6 percent were U.S. subsidiaries of foreign corporations. Only 9 percent of the exclusive licenses were granted to foreign companies.<sup>9</sup>

Under "Conclusions and Recommendations," the majority states "The main concerns are that the benefits of publicly funded research are being sold at bargain basement prices to foreign corpo-

<sup>7</sup> Hearing record at pp. 138-139.

<sup>8</sup> Hearing record at p. 89.

<sup>9</sup> GAO/RCED-92-104, p. 14.



rations, and that the very programs that were initiated to increase U.S. competitiveness are benefiting our economic competitors instead."<sup>10</sup> Yet GAO's own report states that only 9 percent of exclusive licenses were granted to wholly-owned foreign companies. The question needs to be asked as to what, if any, percentage of foreign licensing would be acceptable?

Nine percent of all exclusive licenses over a 2-year period at 35 universities might not seem to be an inordinate amount of foreign intrusion into the technology transfer issue. We need to ask what research and products were covered by these licenses. We know the transfer of defense-related research is strictly monitored and controlled. The hearing record focused on MIT, and the report language discussed programs at other schools. But a detailed analysis of exactly what was transferred, the amount of Federal funds involved in the research and development of each these products, and a discussion of whether U.S. corporations were even interested in the product should have been included within the hearing record and this report.

Foreign companies, especially those along the Pacific Rim, operate in a different manner than American companies for a number of reasons. Many of the Pacific Rim companies are more aggressive in acquiring technology and developing it into their products over a longer period of time as compared to many U.S. and European companies. They have developed capital resources in excess of those available to our domestic companies. They have less of a regulatory burden placed on them by their national governments, and their respective governments have usually provided long-term financial assistance when profits are projected years down the road. Yet the final recommendations of this report would seem to imply that we should "punish" these companies for their ability and willingness to compete.

These traits are part of their culture, a culture that has given them an advantage over our domestic corporations in many ways. The fact is we can't legislate or regulate ourselves to operate in this fashion, and we certainly can't force foreign companies to change their structures and beliefs. This is an important point that was not addressed in the final report.

A final concern is the timing of the hearing and the filing of this report. The hearing was conducted during the first session of the 101st Congress, but the report has now come up at the close of the 102nd Congress. A new GAO report was published in the interim that discussed the workings of similar programs at other universities. It would have been beneficial for the subcommittee to conduct another hearing during this Congress to compare these programs, as well as a reexamination of the MIT program to determine specific changes in policies. A followup hearing would have allowed fuller participation by the current members of the subcommittee, and might have changed the findings and recommendations of this report.

None of the current Republican members of the subcommittee served in that same capacity during the 101st Congress. The Re-

<sup>10</sup> Majority draft at p. 22.



publican professional staff joined the subcommittee almost 2 years after the hearing. As a result, there was no participation in the development of this hearing by the members asked to vote on its findings. This is not the way any full committee or subcommittee should operate.

#### RECOMMENDATIONS

The subcommittee has made several recommendations in this report, and each deserve some comment.

The first recommendation that "Congress should ensure that research funded by U.S. taxpayers will benefit those taxpayers whenever possible" is problematic. The taxpayers will benefit from any product that is brought to the market which addresses serious concerns, cures illnesses, or generally makes their lives a little easier or more productive. Under this basic guideline, it does not matter whether that product is produced at home or abroad. This hearing and report presupposes that foreign companies, purchasing research results from American universities, are not able to provide these "benefits."

This recommendation could never be implemented as written. Many Americans derive "benefits" from foreign-produced products. We would first have to establish the definition of what constitutes a "benefit" in different areas. Once defined, what do we do with that definition? Are "benefits" from foreign companies worth more than domestic "benefits"? Is Congress to enact laws that prevent the actual transfer of research data to foreign countries? Is Congress simply supposed to place or raise the price of such transfers?

The second recommendation, suggesting the National Institutes of Health and National Science Foundation give preference to grant applicants that ensure preferential treatment to American companies, borders on protectionism. The record of this hearing clearly showed that foreign companies benefitted from these programs because they were the ones that took advantage of the opportunities they present. If our institutions have maintained long-standing working arrangements with foreign companies, will they be declared ineligible for all future grant applications? What do we say when a foreign corporation wants to purchase the rights to an orphan drug that has been spurned by domestic manufacturers? And what would this policy do to our corporate relationships with foreign universities?

One of the reasons mentioned for opposing the transfer of technology is the belief that domestic companies "pay twice" for the transfer of technology—first through their tax dollars, and then through the costs of joining an ILP. It is assumed that foreign companies do not pay their "fair share" of taxes, or that they don't pay taxes at all.

The issue of "transfer pricing," the process by which some foreign corporations shift revenues away from their U.S. entities to avoid our taxes, is a legitimate concern. However, foreign corporations do pay taxes to the U.S. Government, and therefore provide to the pool of public funds sent to the National Science Foundation and the National Institutes of Health. Placing "access" as a condition of payment could present some interesting legal and fiscal



problems. In addition, given Dr. Gray's assertions that any entity could simply "pick up the phone" to gain access, many corporations could avoid this "double taxation" simply by knowing whom to call. This is an interesting argument to present, but it should not be used as a basis for enacting counterproductive policies.

The MIT program detailed in the hearing does demonstrate that problems exist within *their* system. They did give preferential treatment to foreign competitors, including a lower cost for participation. We should always strive to "level" the playing field when foreign competition is involved, and MIT should adopt a uniform policy to achieve such a goal. But it is fair to say that they would have given preferential treatment to any company that was willing to "pay the price" for their basic research, just as any other university program would have done. It is these broader issues that need to be discussed before we recommend legislative actions.

The final two recommendations state that institutions receiving HHS and NSF funds "should be required to disclose" all links to companies interested in their research, including investments in companies that may benefit from the results of taxpayer-financed studies. That sort of disclosure is not inconsistent with the standard conflict-of-interest laws that are administered in a variety of government and private settings.

It is not unreasonable to ask universities and their researchers to be as open as possible in their dealings, especially when applying for Federal assistance. But it must be made clear that the intent of any disclosure is to avoid the problems inherent with all conflict-of-interest matters, not as a way to find and discriminate against foreign corporations.

This report has produced a mixed message. There is general agreement that conflicts of interest should be addressed and dealt with, and that the transfer of technology is something we should work for. But the language of the report also implies it is time for stronger and more widespread Government regulation, with an emphasis on preferential treatment of domestic companies. If not handled properly, these mixed messages and recommendations could do more harm to our competitiveness, and hinder necessary research and advancement.

CRAIG THOMAS.



## ADDITIONAL VIEWS OF HON. DONALD M. PAYNE

This report presents a comprehensive analysis based on a 4-year subcommittee investigation, including a subcommittee survey that was initiated in 1989 and a GAO study and report that was requested in January 1990 but not completed until May 1992. It was important that the subcommittee carefully examine whether the problems of foreign access to federally funded scientific access, raised in the subcommittee hearing focusing on MIT, were unique or more widespread.

The results of the investigation indicate that many U.S. universities focus their technology transfer efforts on U.S. industry, but that a few universities, which receive a disproportionate amount of Federal funds, provide substantial technological assistance to foreign companies. Some university administrators claim that this is the fault of American corporate executives, who are not as effective as foreign corporate executives in making use of university-conducted research. However, the subcommittee investigation clearly shows that these cultural differences are only part of the story: Universities such as MIT have created incentives that *foster* foreign participation, by charging lower ILP membership fees to foreign companies, by rewarding faculty who travel to foreign companies more generously than they reward faculty who travel to domestic companies, and by providing a local office for executives in Tokyo. These incentives result in closer ties to foreign companies, and thus may harm U.S. competitiveness.

Foreign companies *should not* be given preferential treatment in obtaining access to federally funded research. On the contrary, there is no reason why U.S. companies should not be given preferential treatment, especially in terms of rights of first refusal in the granting of exclusive licenses.

While it is unfortunate that minority members of the subcommittee were not members at the time of the 1989 hearing, all subcommittee members had complete access to all information that was gathered by the subcommittee in preparation for the report.

It is crucial to emphasize that this report should not be construed as an attack on academic freedom. Academic freedom must be protected, and faculty must be able to share their research findings with colleagues all over the world. However, in situations where access to research is not free, but is instead being *sold*, it is important that the interests of taxpayers who support federally funded research be protected.

DONALD M. PAYNE.