GAO

Briefing Report to the Honorable
Lloyd Bentsen, U.S. Senate

March 1988

R&D FUNDING

Foreign Sponsorship of U.S. University Research

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GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

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March 4, 1988

The Honorable Lloyd Bentsen
United States Senate

Dear Senator Bentsen:

You asked us to examine foreign firms' and governments' sponsorship of research in U.S. universities and national laboratories. In your letter, you indicated an interest in possible increasing trends in the funding of research in American scientific institutions by foreign companies, particularly research in areas of commercial importance in which those companies compete against U.S. companies. In response to your request, this report provides information on

- the extent of foreign funding in terms of dollars, recipients, and sponsored research fields and
- the terms and conditions universities place on foreign versus U.S. sponsors and the differences between U.S. and foreign companies in their sponsorship and use of university research.

This report examines foreign sponsorship in universities; a companion report, assessing foreign involvement in the federal laboratories, will be forthcoming.

To obtain this information, we sent a questionnaire to the 150 universities with the greatest expenditures in research and development (R&D). The 134 universities that responded accounted for 85 percent of all university R&D expenditures in fiscal year 1985, and included 24 of the top 25 research universities. We collected data on research expenditures for fiscal year 1986 and other information on the questionnaires, and obtained additional information through interviews with selected university researchers and administrators. (For further information about our methodology, refer to sec. 1.)

We found that R&D sponsored by foreign sources accounted for only 1 percent of all university R&D expenditures. Further, of all industry-sponsored university R&D expenditures, foreign sources accounted for only 5 percent. Although over 100 universities reported foreign funds, 5 universities account for about half of those funds. These five universities—Texas A&M University, Harvard University, Massachusetts Institute of Technology, Oregon State University, and the University of Wisconsin—

received funds in diverse areas and from an array of foreign countries. The majority of the research sponsored by foreign sources at these universities is not in areas identified by the Department of Commerce as those expected to play a significant role in the economic growth of the United States by the year 2000. Across all universities, foreign support is broadly distributed across research fields, and comes from diverse sources.

In addition, we found that universities generally make few distinctions between U.S. and foreign companies in accepting or administering R&D funds. Further, universities reported few differences in the ways U.S. or foreign companies sponsor or use research.

Sections 2 and 3 of this briefing report provide details obtained from the questionnaire regarding foreign involvement in U.S. university R&D. Appendix I contains a copy of the questionnaire, with aggregate responses for each question. Appendix II lists the universities that responded to the questionnaire, along with reported R&D expenditures by source. If you have further questions, please contact me at (202) 275-8545.

Major contributors to this briefing report are listed in appendix III.

Sincerely yours,

Sarah P. Frazier

Sarah Frazier Jaggar
Associate Director

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Abbreviations

Ag	agriculture
Brnch	branch
Calif	California
Dent	dentistry
FY	fiscal year
Gal	Galveston
GAO	General Accounting Office
HC	health science center
Ill	Illinois
Inst	institute
Int'l	international
Med	medicine
MIT	Massachusetts Institute of Technology
NC	North Carolina
NJ	New Jersey
NSF	National Science Foundation
Poly	polytechnic
R&D	research and development
S	southern
SC	South Carolina
Sci	science
Tenn	Tennessee
TX	Texas
U	university
UC	University of California
UH	University of Hawaii
UMDNJ	University of Medicine and Dentistry of New Jersey
VT	Vermont

Introduction

Increased emphasis has been placed on the role of U.S. universities' scientific research in fostering technological innovation because America's competitive edge in the world has slipped. For example, The Report of the President's Commission on Industrial Competitiveness, released in 1985, notes that basic research produces the information which makes technological innovation possible. And technological innovation, in turn, enhances industrial competitiveness. The focus on the relationship between basic research—which in the United States occurs primarily in universities—and competitiveness has given rise to a concurrent concern that foreign competitors are relying on U.S. university research to develop their commercial successes.[1] This report examines the extent of foreign firms' and governments' sponsorship of research and development (R&D) at U.S. universities.

Objective, Scope, and Methodology

Our objective was to provide information on foreign firms' and governments' sponsorship of R&D at U.S. universities. Our review addressed the extent of foreign sponsorship in dollars, sources of foreign funds, number of universities and fields of science receiving foreign funds; the terms and conditions of foreign sponsorship; whether differences exist between foreign and U.S. firms in their sponsorship and use of university R&D; foreign membership in university-established industrial liaison programs; and foreign gifts to U.S. universities.

Data for this report were obtained through a survey mailed to the 150 universities which had the largest R&D expenditures in fiscal year 1985, according to National Science Foundation (NSF) data. A copy of the questionnaire appears in appendix I, and a list of the 134 universities responding to the questionnaire can be found in appendix II. These 134 universities accounted for 85 percent of R&D expenditures by all universities in fiscal year 1985, and included 24 of the nation's 25 top universities and 46 of the 50 top universities in R&D expenditures. We collected data for 1986.

Where it was necessary to clarify or supplement the data obtained from the questionnaire, additional information was obtained through telephone interviews with university administrators and researchers. We also reviewed brochures, pamphlets, and other documents from the universities.

[1] A related concern, that U.S. universities may be training foreign graduate students who return to foreign industries, was addressed in an earlier GAO report, Plans of Foreign Ph.D. Candidates: Postgraduate Plans of U.S. Trained Foreign Students in Science/Engineering (GAO/RCED-86-102FS).

We defined "foreign sources" of R&D funding as

- foreign governments and individuals,
- nonprofit organizations headquartered in a foreign country,
- businesses headquartered in a foreign country,
- U.S. subsidiaries of foreign corporations, and
- joint-venture businesses in which the foreign partner has a controlling interest.

Although there is no generally accepted uniform definition of "foreign sources," the one we used is similar to that which New York State requires universities to use in reporting funds. We asked that foreign subsidiaries of U.S. corporations be excluded. We also asked that R&D funded by international agencies, such as the World Bank and the World Health Organization, be reported separately and not included as foreign sources.

Our audit work was conducted from March 1987 to October 1987, primarily in Washington, D.C. Except that we did not verify the figures reported to us by the universities, our audit work was performed in accordance with generally accepted government auditing standards.

Extent and Distribution of Foreign Funds

R&D sponsored by foreign sources was a small part of all university R&D expenditures as well as a small part of industry-sponsored university R&D expenditures. It is concentrated in a few universities, is broadly distributed across research fields, and comes from diverse sources. This section provides information on the extent of all foreign sources and of foreign business sources of funding of U.S. university R&D, the university recipients of foreign funds, the foreign countries that provide funds for U.S. university R&D, and the university departments or research fields which receive foreign funds.

Extent of Foreign Funding of U.S. University Research

There is little foreign funding of U.S. university R&D, and most of this foreign funding does not come from industrial sponsors. Further, very few universities are actively soliciting foreign funds.

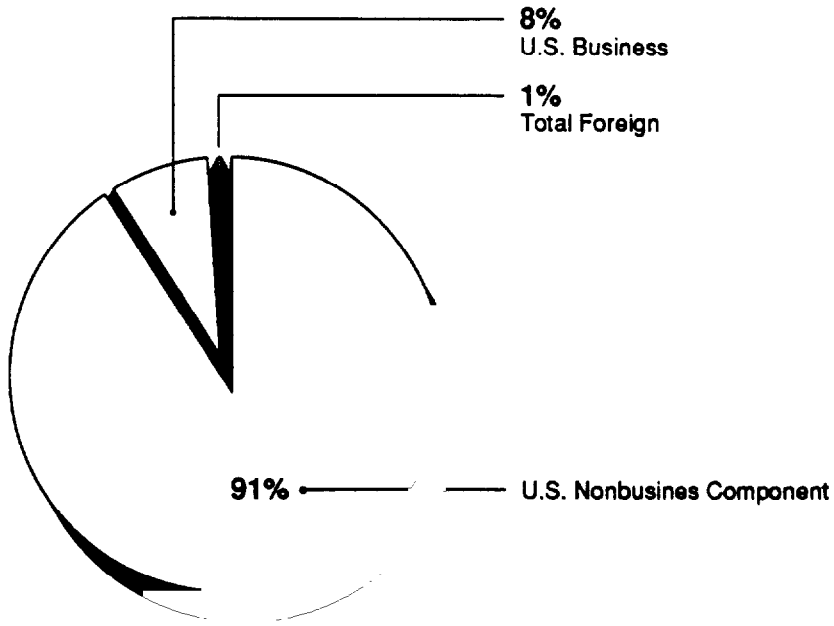
As indicated in figure 1.1, university responses to our questionnaire showed that foreign funds accounted for $74.3 million, or about 1 percent of the $6.8 billion in total R&D expenditures in fiscal year 1986 by the 107 universities reporting foreign funds.[1] We did not collect data on R&D expenditures at the 27 universities that reported no foreign funds. In aggregate, however, all foreign sources would have accounted for less than 1 percent of R&D expenditures at the 134 universities responding to our questionnaire.

Foreign businesses supported very little U.S. university research. Universities reported that $27.6 million (37 percent) of their foreign funds were from business sources, and $46.8 million (63 percent) came from nonbusiness sources, including governments and nonprofit organizations. Therefore, foreign businesses accounted for about one-third of 1 percent of the R&D expenditures of the 107 universities reporting foreign funding. By contrast, U.S. businesses accounted for $512.5 million, or 8 percent of total R&D expenditures by these universities. Taking as a base the $540.1 million total in foreign and U.S. business support of university R&D, foreign businesses accounted for 5 percent of all business-sponsored R&D at U.S. universities. Further evidence of the small amount of foreign business funding is that only 12 universities reported a total of 13 foreign business agreements worth $500,000 or more.

In our questionnaire, we asked several questions to explore whether U.S. universities are actively soliciting foreign funds. According to the

[1] Universities were asked to report R&D funds from international organizations like the World Bank separately. R&D expenditures from these sources totaled $7 million.

Figure 2.1: University R&D Expenditures by Source of Funding[a]



Total R&D expenditures: 6.8 billion dollars.

[a]Based on data from 107 universities report ing foreign funds in FY 1986.

responses, the vast majority of the 134 universities in our sample have not and do not plan to establish foreign offices. Further, they do not plan to hire foreign businesses or organizations to solicit funding or negotiate licenses for university-developed technology. One university reported having a permanent office in a foreign country to solicit funding, and two reported plans to establish such an office in the next 2 years. Five universities reported having a foreign business or other organization under contract to solicit funding and/or to negotiate licenses for university-developed technologies. An additional six universities reported that they have plans to do this in the next 2 years.

Recipients of Foreign Funds

Foreign funds are highly concentrated in a few universities. While 107 of the 134 universities responding to our questionnaire reported that they had received some foreign funds for R&D, most of those funds were concentrated in 5 schools. As table 2.1 shows, 5 universities accounted for 51 percent of the foreign R&D funds. Alternatively, 74 of the 107

universities each received less than $500,000 total in fiscal year 1986 from all foreign sources.

Table 2.1: Universities' R&D Expenditures From Foreign and All Sources, FY 1986[a]

Dollars in millions

Recipients	Total from foreign sources	Percentage of foreign sources	Total from all sources	Percentage of all sources
All universities[a]	$74.3	100	$6,808.2	100
Top 20[a]	58.4	79	2,190.0	32
Top 5[a]	37.7	51	918.2	13

[a]Of the 107 universities reporting foreign funds. Ranking of universities is on the basis of reported R&D expenditures from foreign sources.

Top Five U.S. University Recipients of Foreign Funds

Foreign funding at the five universities with the most foreign funds makes up a small part of their total R&D expenditures. There are very few similarities among the five universities in their foreign-sponsored research fields or their foreign country sponsors. The five universities—Texas A&M University, Harvard University, Massachusetts Institute of Technology (MIT), Oregon State University, and the University of Wisconsin—accounted for 51 percent of the foreign R&D funding among the universities in our sample. However, the foreign component of their total R&D expenditures ranged from only 1 to 9 percent, and averaged 4 percent.

As table 2.2 shows, these universities received funds in diverse areas and from an array of foreign countries. Because of the differences in foreign-sponsored research among the universities, there is no indication of targeting of specific research areas. With the exception of MIT, the majority of the research sponsored by foreign sources at these five universities is not in the areas identified by the Department of Commerce as "emerging technologies," those technologies which will lead to new products or processes and which are expected to play a significant role

in the economic growth of the United States by the year 2000.[2] Table 2.2 briefly describes how each of the five universities use foreign funds.

[2]The Department of Commerce has identified 17 emerging technologies in: "The Status of Emerging Technologies: An Economic/Technological Assessment to the Year 2000," released mid-1987. The emerging technologies identified are:

— Advanced materials: ceramics, polymer composites, and metals.
— Electronics: advanced microelectronics, optoelectronics, and millimeter wave technology.
— Automation: manufacturing, business and office systems, and technical services.
— Biotechnology: genetic engineering, and biochemical processing.
— Computing: computing equipment and artificial intelligence.
— Medical technology: drugs, instruments, and devices.
— Thin-layer technology: surfaces and interfaces, and membranes.

Table 2.2: R&D Expenditures From Foreign and All Sources at the Five U.S. Universities Reporting the Most Foreign Funds, FY 1986

Dollars in million

University	Total foreign R&D expenditures	Total R&D expenditures from all sources	Description of foreign-sponsored research
Texas A&M	$15.2[a]	$165.4	Ninety-nine percent of foreign funds was from nonbusiness sources and in support of an ongoing international ocean-drilling program run by NSF. Canada, France, Japan, the United Kingdom, West Germany, and the European Science Foundation (a group of 12 countries) each contributed about $2.5 million to the program in 1986. NSF added about $20 million. The major objectives of the program are to gain an improved understanding of the history of the ocean, the changing climate of the globe, and the processes by which ocean crusts and continental margins are formed.
Harvard	10.8[b]	185.7	Ninety-five percent of foreign funds was from nonbusiness sources; 92 percent in the areas of trade, finance, and banking. Four countries accounted for 90 percent of Harvard's foreign funds: Korea, Indonesia, Bangladesh, and Kenya. Through the Harvard Institute for International Development, foreign funds supported the following types of projects: development of a trade ministry, strengthening the analytic capability of the ministry of finance, and reviewing the capital incentive structure.
MIT	5.3[c]	256.1	Ninety-eight percent of foreign funds was from businesses. Japan accounted for 42 percent of foreign funds, the United Kingdom accounted for 15 percent, and other West European countries accounted for an additional 28 percent. About three-fourths of foreign-funded research was distributed among eight engineering fields. Computer engineering and science, in the Arts and Media Laboratory, was the largest, at 18 percent, of foreign-funded research; followed by chemical engineering, largely biotechnology, at 16 percent; and civil engineering, largely geo-technical modelling research at 11 percent. Biology accounted for another 18 percent of foreign funds and was primarily cancer-related.
Oregon State University	4.1[d]	80.0	Seventy-eight percent of foreign funding was from nonbusiness sources. Half was from Mexico, Poland, the USSR, the United Nations, and Tunisia. Other Middle East countries and multinational businesses accounted for another 43 percent of foreign funds. Ninety-seven percent of foreign funds was specifically for developing agricultural colleges, increased capacity for agricultural extension, and agricultural management capacity.
University of Wisconsin	2.4[e]	231.0	Eighty-nine percent of foreign funding was from business sources. Foreign funding came from more than 10 countries. About half was in weather monitoring, and 10 percent was in agriculture, the second largest field. The remaining foreign support was dispersed across more than eight research fields.

[a]Foreign funding is 9 percent of all sources.
[b]Foreign funding is 6 percent of all sources.
[c]Foreign funding is 2 percent of all sources.
[d]Foreign funding is 5 percent of all sources.
[e]Foreign funding is 1 percent of all sources.

Sources of Foreign Funds

The countries that support R&D in U.S. universities are diverse. These countries tend to concentrate their support in a few universities. As table 2.3 shows, there was no single country that predominated over the others in providing funds for R&D in U.S. universities in fiscal year 1986. Japan sponsored more R&D than any other single country in our sample, but the United Kingdom and West Germany were also major contributors. As a region, Western Europe accounted for $28.9 million, or 39 percent of the foreign funds reported to us.

Table 2.3: Foreign Funds by Country and Region, FY 1986

Dollars in millions

Country/Region	Dollars
Western Europe:	$28.9
United Kingdom	7.0
West Germany	5.6
Other Western Europe	16.3
Far East:	18.3
Japan	9.5
Other Far East	8.8
Middle East:	7.9
Israel	0.7
Other Middle East	7.2
Other:	17.5
Canada	5.7
Multinational	1.5
Other[a]	10.3

[a]For the top five universities receiving foreign funds, "other" included: Columbia, Brazil, Mexico, Poland, the USSR, and Tunisia.

Table 2.4 demonstrates that, just as overall foreign funding was concentrated, funds from each country were concentrated in a few universities. For example, although Canada sponsored R&D at 45 universities in fiscal year 1986, one university, Texas A&M, accounted for almost one-half of the R&D expenditures from Canada. Three universities accounted for most of the concentration in foreign funds by country. At Texas A&M, which received the most foreign money, 99 percent of those foreign

funds were in support of an international ocean-drilling program run through NSF. The second university, Harvard, received most of its foreign funds in trade, finance, and banking research. The third university, MIT, had 91 percent of its foreign funds spread among biology and 8 fields of engineering. The research programs at these three universities are explained in more detail in table 2.2.

Table 2.4: Foreign Countries as a Source of R&D Funds to U.S. Universities, FY 1986

Country/region[a]	Number of universities receiving funds	Number of universities receiving $100,000 or more	Universities ranking 1 to 4 in R&D expenditures from country	Percentage from country at university
Canada	45	13	Texas A&M[b]	43
			MIT	7
			N.C. State U.	7
			Oregon Health Science U.	5
Japan	53	15	Texas A&M[b]	26
			MIT	23
			U. Washington	14
			U. Arizona	4
Other	22	8	Harvard	79
Far East			U. Wisconsin	4
			U. Washington	3
			MIT	3
Middle East	24	6	Harvard	39
(excludes			UC, Davis	19
Israel)			Georgia Tech	18
			Oregon State U.	14
United Kingdom	40	13	Texas A&M[b]	37
			U. Alabama	13
			MIT	11
			Johns Hopkins U.	10
West Germany	40	9	Texas A&M[b]	46
			U. Arkansas	7
			MIT	6
			U. Texas-Austin	5
Other West	80	34	Texas A&M[b]	16
European			U. Arkansas	9
			MIT	7
			U. Wisconsin	7

[a]Table 2.4 excludes Israel and multinational sources because of their small size, and the category "other countries" because of the great diversity in its composition.

[b]As described earlier, Texas A&M received about $2.5 million in 1986 from each of these countries for an ocean-drilling program which is sponsored by NSF. (See table 2.2.)

University Departments Receiving Funds

Foreign funds for U.S. university R&D are broadly distributed across research fields. As demonstrated in table 2.5, three fields stand out as being much larger than the other fields: geology, agriculture, and medicine. Outside of these three fields, universities reported foreign funds in 14 additional specific fields, none of which received more than $3 million.

- Geology accounted for more foreign funds than any other field, $16.4 million. Ten universities used foreign funds for R&D in geology, but as previously discussed, $15.2 million, or 93 percent of these funds, is explained by a single international program run at Texas A&M University by NSF. This program is described in more detail in table 2.2.
- Although 25 universities in our sample received foreign funds for agricultural research, 4 universities accounted for $8.8 million, or 77 percent of those funds. The agricultural research supported at these four universities is for agricultural development in developing countries.
- In the field of medicine, 46 universities in our sample received foreign funds. Eight universities accounted for $4.7 million, or 56 percent of those funds. At those universities, the foreign funds supported research in areas including clinical testing of pharmaceuticals, neuropsychiatric research, and radiology.

The "other" category, which accounted for about 30 percent, or $21.3 million of all foreign funding reported to us, supported fields too diverse to be described easily. For the five universities receiving 51 percent of foreign funds, "other" included research in trade, banking, and finance; meteorology/weather forecasting; forestry; and oceanography. For the universities outside of the top five, "other" included fields as diverse as: history, linguistics, pharmacy, humanities, and fisheries science.

Table 2.5: Foreign Funds by University Department, FY 1986

Dollars in millions

Field	Dollars
Geology	$16.4
Computer engineering	1.1
Aeronautical engineering	3
Chemical engineering	1.5
Civil engineering	2.7
Electrical engineering	.7
Materials engineering	1.3
Mechanical engineering	.8
Nuclear engineering	4
Other engineering	1.1
Agriculture	11.5
Medicine	8.4
Biology	2.6
Chemistry	1.5
Physics	.5
Psychology	.1
Other	21.3

Other Characteristics of Foreign Involvement in U.S. Universities

We found that universities generally make few distinctions between U.S. and foreign companies in accepting or administering R&D funds, and they reported few differences in the ways U.S. or foreign companies sponsor or use university research. We also found that foreign indirect support of university R&D programs, through industrial liaison programs and gifts, is not extensive. This section addresses two aspects of foreign involvement in U.S. university R&D. The first concerns the relationships that universities have with foreign companies vis-a-vis U.S. companies which sponsor R&D. The second is the extent to which foreign companies are involved in university R&D through means other than directly supporting research.

Differences Between Foreign and Domestic Sponsorship

University Policies on Foreign Sponsorship

University policies and practices in accepting or administering research funds generally do not distinguish between U.S. and foreign sponsors. Where there are differences, U.S. universities tend to place greater restrictions on foreign than on U.S. sponsors. Our questionnaire asked universities if they had any special policies or procedures that distinguished between U.S. and foreign research sponsors in the following areas: when receiving funds, granting licenses, reviewing agreements, or negotiating contract terms.

As table 3.1 shows, depending on the area, between 10 and 31 universities reported making distinctions between domestic and foreign sponsors of research. Across all areas identified in the questionnaire, 46 universities identified at least one distinction between foreign and U.S. sponsors.

Table 3.1: Distinctions Made by Universities Between U.S. and Foreign Sponsors in Accepting or Administering R&D Funds

Area	No difference	Difference	Uncertain	Total
Receiving funds	117	10	N/A	**127**
Licensing of information	113	12	N/A	**125**
Review of agreements	89	31	7	**127**
Contract terms	93	24	9	**126**

The differences that universities described in the questionnaires dealt primarily with the financial and legal provisions of funding research, and tended to put more restrictions on foreign sponsorship. The distinctions most frequently mentioned by the universities included the following:

- Twenty universities reported payment provisions, such as requiring advance payment of the full amount in U.S. dollars (for 10 of these universities, this was the only distinction they reported making between U.S. and foreign sources).
- Twelve universities reported subjecting foreign funding to greater scrutiny in general and/or approval through different review channels than domestic funding.
- Twelve universities reported ensuring that research agreements comply with U.S. export control regulations and other laws.

Differences in the Sponsorship and Use of Research by Foreign and Domestic Businesses

The universities reported few differences between U.S. and foreign companies in the ways they sponsor or use research. Because some observers have suggested that foreign sponsors of U.S. university research become more involved in the research than U.S. sponsors, the questionnaire contained a series of questions asking universities whether they perceived differences in the way a typical foreign business approaches university research compared with a typical U.S. business, and if so, to identify them.

Of the 107 universities reporting receipt of foreign funds, between 5 and 14, depending on the question, stated that foreign companies' approaches were typically different from that of their U.S. counterparts. Of the universities reporting differences, the most frequent responses were as follows:

- Eight reported that foreign companies tend to show greater interest in funding long-term R&D.
- Eight said that foreign firms tend to support narrowly defined research projects.
- Seven reported that foreign businesses will send its scientists to work at the university's laboratory more frequently.

Other Forms of Foreign Sponsorship

Industrial Liaison Programs

Universities have established industrial liaison programs to increase industrial access to university research information. Liaison programs provide an identifiable contact point to which industrial representatives can go when they want to identify ongoing research of interest to them at the university, or to identify a specific researcher at the university who may be able to assist them with problem areas. Specific membership benefits reported by the universities are listed at the end of this section. Of the 107 universities reporting foreign funding, 41 identified 281 different liaison programs. In return for membership benefits, universities may charge a fee or request a contribution.

To place a consistent boundary on the data, universities were asked to identify three of their major industrial liaison programs. The 41 universities reported that among these major programs, 70 percent (or 71) had been created since 1980, and that they had 2,848 U.S member companies (85 percent) and 496 foreign member companies (15 percent).

Based on the data we collected, it is not possible to determine how much money foreign sources contribute to industrial liaison programs at universities. Three universities accounted for 379, or 76 percent, of the foreign members reported to us: Texas A&M University, MIT, and the University of California at Berkeley. At Texas A&M, the only liaison program identified with foreign members did not charge an annual fee. MIT identified 116 foreign members in its university-wide liaison program, and we were told that fees are based on size of company and range from $25,000 to $100,000. MIT also has 30 foreign members in a liaison program for materials processing. This program has an annual fee which was not specified in the questionnaire. The University of California at Berkeley reported 42 foreign members in an industrial liaison program. According to a university official, 80 to 90 percent of these 42 had been made members in the liaison program as a result of sponsoring research projects. Fees to join the liaison program at Berkeley begin at $5,000. The liaison programs identified by Texas A&M University, MIT, and the University of California at Berkeley were university-wide and in the areas of thermodynamics, oceanography, chemistry, transportation studies, materials processing, and engineering.

Benefits of industrial liaison program membership are diverse. Of the 36 universities in our sample that described members' rights, the membership benefits shared by more than half of the respondents included seminars, symposia, or other formal meetings; the distribution of various publications such as research reports, abstracts, and newsletters; and interactions or consultations with university faculty or graduate students.

Other benefits included access to university facilities such as computer centers and libraries; access to student resumes; visits by faculty to corporate facilities; the ability to help select research projects; and continuing education and industrial scholar programs.

Foreign Endowments and Gifts for Research Programs and Facilities

Of the 134 universities responding to our questionnaire, 20 reported having received, since the start of fiscal year 1984, an accumulated total in gifts or endowments of more than $500,000 for R&D programs, facilities, and/or equipment from any single foreign source. The gifts and endowments identified totaled $27.3 million. Japan accounted for the largest number of foreign gifts and endowments (12), followed by Canada (3). The Japanese gifts and endowments were for: imaging in the arts and media; equipment purchase or facilities construction; supporting a faculty chair; fisheries research, research into legal restrictions in the Pacific Community, construction technology research, and radiology research; fellowships; and supporting a center on Japanese business and economics. Other countries providing gifts or endowments include: Switzerland, Spain, Italy, Israel, Peru, and Somalia.

Questionnaire, With Aggregate Results

This appendix contains a copy of the questionnaire mailed to the 150 universities determined by the National Science Foundation to have the largest R&D expenditures in fiscal year 1985. One hundred thirty-four universities responded to the questionnaire. The data reported by the 134 respondents has also been included. Sample sizes vary from question to question because not all universities reporting foreign funds responded to every item in the survey.

Three universities responded too late to be included in this analysis. R&D data for these universities are reported in appendix II.

U.S. GENERAL ACCOUNTING OFFICE SURVEY
Foreign Funding of University Research and Development

INTRODUCTION

In response to a congressional request, the U.S. General Accounting Office (GAO) is collecting information about foreign funding of research and development (R&D) at U.S. universities. Our objectives are to (1) identify the amount and characteristics of foreign funding, (2) describe universities' policies relating to foreign sponsorship of research and licensing of university technology, (3) identify differences that universities perceive in the approaches of foreign and U.S. businesses in sponsoring research, and (4) obtain university perspectives on the federal government's role in stimulating collaboration between universities and U.S. businesses. To gather the information, we are sending this questionnaire to the 150 universities that had the highest R&D funding from all sources in 1985.

The information collected through this survey will be included in our report to the Congress. While the information we collect generally will be reported in summary form, individual universities may be identified in some cases. If there are any responses to individual questions that you consider sensitive and want held in confidence, please indicate this on your completed questionnaire by writing the word CONFIDENTIAL next to your response. Such responses will not be reported on individually or released to anyone outside GAO.

The focus of this questionnaire is fiscal year 1986. In answering the questions, please provide data based on your university's fiscal year. Please do not include funding or other information relative to a federally-financed R&D center (FFRDC) or a government-owned, contractor-operated (GOCO) laboratory that your university operates. The term "R&D agreement" is intended to include contracts, grants, and cooperative agreements for R&D projects.

Your cooperation in completing this questionnaire is vital to our study. Please return your completed questionnaire in the enclosed self-addressed business reply envelope by May 22, 1987, if possible. If you have any questions, please feel free to call Ric Cheston on (202) 634-4925.

In the event the envelope is misplaced, return your questionnaire to:

U.S. General Accounting Office
Mr. Ric Cheston
Room 4476
441 G Street, N.W.
Washington, DC 20548

NOTE: If your university has an associated independent organization, such as a foundation or medical school, for which you cannot provide data, please call Mr. Cheston to provide a point of contact for the associated organization. In addition, if your university is part of a multi-unit state system, please indicate at the end of this questionnaire (Question 25) whether your responses apply to your unit alone or to additional units in the system.

DEFINITION OF FOREIGN SOURCES OF R&D FUNDING:

For purposes of completing this questionnaire, we have defined "foreign sources" of R&D funding to include:

-- foreign governments and individuals,
-- nonprofit organizations headquartered in a foreign country,
-- businesses headquartered in a foreign country,
-- U.S. subsidiaries of foreign corporations, and
-- joint venture businesses in which the foreign partner has controlling interest.

Foreign subsidiaries of U.S. corporations should be excluded. Also, R&D funded by international agencies, such as the World Bank and the World Health Organization, has been separately broken out and should not be included in foreign sources.

We recognize that it may be difficult to identify U.S. subsidiaries of foreign corporations or joint ventures in which the foreign partner has controlling interest. Furthermore, several questions seek numerical and other information on the country/region of the foreign source which may not be readily available or identifiable. Please use your best judgment in making these determinations. While we would prefer that you use our definition of foreign sources, if this is too burdensome, please use your university's own operating definition. If you use a different definition than ours, check the box below and briefly describe your definition.

[__] We are using our university's definition.

1. What was the first and last month of your university's 1986 fiscal year?

1986 Fiscal Year _____/_____ TO _____/_____
Month/Year Month/Year

SPONSORSHIP OF R&D PROJECTS

2. During FY 1986, did your university conduct R&D that was funded by foreign sources (governments, businesses, nonprofit and other organizations)? Please do not include expenditures related to endowments and gifts for a department or research facility or training awards. (Check one.)

1. [107] Yes n=134

2. [27] No --> Skip to Question 13

3. We are interested in obtaining information about the amount of funding for R&D in FY 1986 from various foreign and U.S. sources. Please provide the information requested below and indicate if the information being provided is actual or an estimate.

	ENTER Dollar Amount	CHECK ONE Actual 1	Estimate 2
a. Total R&D expenditures	$ 6,808,171,922 n=104	n=81	n=20
b. Total expenditures for R&D funded by international agencies such as the World Bank	$ 7,167,142 n=92	n=69	n=20
c. Total expenditures for R&D funded by all foreign sources (government, businesses, nonprofit and other organizations)	$ 74,381,773 n=105	n=69	n=31
d. Total expenditures for R&D funded by all foreign businesses	$ 27,607,984 n=101	n=70	n=29
e. Total expenditures for R&D funded by all U.S. businesses	$ 512,521,452 n=101	n=57	n=41

4. Approximately what percentage of your university's expenditures for R&D that was funded by foreign sources (governments, businesses, nonprofit and other organizations) in FY 1986 came from each of the following countries/regions? (Enter percent for each. If none, enter 0. Percents should add to 100%.)

n=103

FOREIGN SOURCES	PERCENT
a. Canada	8 %
b. Japan	13 %
c. Other Far East countries (including China, Taiwan, and South Korea)	12 %
d. United Kingdom	10 %
e. West Germany	8 %
f. Other Western European countries	22 %
g. Israel	1 %
h. Middle East (including Egypt)	10 %
i. Multinational businesses - country uncertain	2 %
j. Other (SPECIFY REGION(S))	14 %
	100%

5. About how many R&D agreements did your university have in effect with U.S. and foreign businesses in FY 1986? (Enter number for each. If none, enter 0.)

   a. U.S. Businesses 21,307 n=98

   b. Foreign Businesses 1,145 n=104

6. About how many individual R&D agreements did your university have in effect with businesses from the following countries/regions in FY 1986? (Enter number for each. If none, enter 0.)

FOREIGN SOURCES	NUMBER
a. Canada	112
b. Japan	151
c. Other Far East countries (including China, Taiwan, and South Korea)	35
d. United Kingdom	168
e. West Germany	155
f. Other Western European countries	398
g. Israel	10
h. Middle East (including Egypt)	25
i. Multinational businesses - country uncertain	41
j. Other (SPECIFY REGION(S))	47

7. Did your university have any R&D agreements with foreign businesses in effect during FY 1986 that had a total dollar value of $500,000 or more? (Check one.)

   1. [__] No 12 universities had 13 agreements worth $500,000 or more.

   2. [__] Yes --> a. How many of these agreements did your university have in effect in FY 1986? _____

      b. Are any of these agreements secret or classified? (Check one.)

         1. [__] Yes None of the reported agreements were classified.

         2. [__] No

NOTE: For the two largest nonsecret R&D agreements of $500,000 or more, please complete Questions 7a thru 7i

8. Does your university have industrial liaison or equivalent programs through which businesses can get access to research results, university scientists, and/or laboratories in specified areas? (Check one.)

   1. [__] Yes --> How many programs? 281 n=41

   2. [__] No --> Skip to Question 11

9. Please provide the following information for three of your major industrial liaison programs.

University Department(s) Involved	Number of Member Businesses In FY 1986	Number of Foreign Businesses In FY 1986	Year Program Was Established[a]	Is Annual Fee Required?[b] Yes 1	No 2
A wide range of univer-	2,190 n=43	410 n=42	19 a	b	b
sity departments are	723 n=30	46 n=28	19 a	b	b
involved with ILPs.	431 n=27	40 n=27	19 a	b	b

10. What rights do business members receive in the program(s) identified above? Please attach any descriptive material concerning business members' rights to this questionnaire.

See Section III

[a] Of the 102 Industrial Liaison Programs identified, 71 or 70% have been started since 1980.

[b] Requirements for, and amounts of fees varied from university to university.

11. Approximately what percentage of your university's R&D that foreign sources funded in FY 1986 was for work in each of the following departments? (Enter percent for each. If none, enter 0. Percents should add to 100%.)

n=103

DEPARTMENTS	PERCENT
a. Agriculture	16 %
b. Biology	4 %
c. Chemistry	2 %
d. Computer Engineering & Science	2 %
e. Engineering	
1. Aeronautical	0.5 %
2. Chemical	2 %
3. Civil	4 %
4. Electrical	1 %
5. Materials	2 %
6. Mechanical	1 %
7. Nuclear	0.5 %
8. Other	2 %
f. Geology	22 %
g. Mathematics	0 %
h. Medicine	12 %
i. Physics	1 %
j. Psychology	0 %
k. Other (SPECIFY)	28 %
l. Other (SPECIFY)	%
m. Other (SPECIFY)	%
	100%

See p. 37 for summary of responses.

12. We are interested in knowing whether a typical foreign business's approach to university research is similar to or different from the approach of a typical U.S. business. For each area listed, please indicate whether or not you perceive there is a difference and specify the nature of the difference.

-- See p. 39a for differences specified by universities.

A. Interest In Funding Long-Term Versus Short-Term R&D. n=100

1. [64] Typically no difference — 27 Not applicable
2. [14] Typically different --> Specify — 7 No response
3. [22] No basis to judge

B. Willingness To Allow the University's Investigator Discretion To Select the Research Project Within A General Research Area Versus Funding A Specific, Narrowly Defined Project. n=100

1. [71] Typically no difference — 27 Not applicable
2. [10] Typically different --> Specify — 7 No response
3. [19] No basis to judge

C. Requests To Delay Research Publications. n=101

1. [78] Typically no difference — 27 Not applicable
2. [5] Typically different --> Specify — 6 No response
3. [18] No basis to judge

D. Business's Management and/or Scientists Are Likely To Visit the Campus To Discuss the Research. n=100

1. [60] Typically no difference — 27 Not applicable
2. [11] Typically different --> Specify — 7 No response
3. [29] No basis to judge

E. The Business Sends Its Scientists To Work At the University's Laboratory. n=100

1. [48] Typically no difference — 27 Not applicable
2. [11] Typically different --> Specify — 7 No response
3. [41] No basis to judge

F. Interest In Supporting Graduate Students As Part of the Research Team n=101

1. [68] Typically no difference — 27 Not applicable
2. [7] Typically different --> Specify — 6 No response
3. [26] No basis to judge

QUESTION 12 CONTINUES ON THE NEXT PAGE

G. The Business (1) Provides Funds or Donates Equipment for the Research and/or (2) Provides Funds For Equipment Maintenance or For Space Renovation To House Equipment. n=100

1. [55] Typically no difference — 27 Not applicable
2. [11] Typically different --> Specify — 7 No response
3. [34] No basis to judge

13. Does your university have a permanent office in a foreign country to solicit funding? (Check one.) n=131

1. [130] No
2. [1] Yes --> Specify country(s)

Japan

14. Does your university plan to establish any (additional) permanent office(s) in a foreign country to solicit funding within the next 2 years? (Check one.) n=130

1. [84] Definitely no
2. [39] Probably no
3. [5] Uncertain
4. [2] Probably yes
5. [0] Definitely yes

--> In which country(s)?

Japan

15. Does your university currently have under contract any foreign businesses or other organizations that solicit funding and/or negotiate licenses for university developed technologies? (Check one.) n=129

1. [124] No
2. [5] Yes --> Please specify the business/organization and country of origin.

All reported were in Japan

16. Does your university plan to hire any foreign business or organization to solicit funding and/or negotiate licenses for university-developed technologies within the next 2 years? (Check one.)

1. [61] Definitely no n=128
2. [49] Probably no
3. [12] Uncertain
4. [5] Probably yes
5. [1] Definitely yes

17. Does your university have any formal policies that distinguish between U.S. and foreign businesses regarding the receipt of funding and licensing of university inventions to foreign businesses? (Check one for each.)

See p. 38.

A. Receipt of Foreign Funding n=127

1. [117] No
2. [10] Yes --> Please attach a copy of policy or summarize it below.

See p. 38.

B. Licensing to Foreign Businesses

1. [113] No n=125
2. [12] Yes --> Please attach a copy of policy or summarize it below.

See p. 38.

18. In your opinion, are there typically any differences in your university's process for reviewing an R&D agreement negotiated with a foreign business versus a U.S. business? (Check one.)

1. [21] Definitely yes n=127
2. [10] Probably yes
3. [7] Uncertain
4. [58] Probably not
5. [31] Definitely not

IF DEFINITELY YES OR PROBABLY YES, BRIEFLY EXPLAIN YOUR RESPONSE.

See p. 38.

19. In your opinion, are there any major differences between contract terms that your university has typically negotiated or would negotiate with a foreign business versus a U.S. business? (Check one.) n=126

1. [14] Definitely yes

2. [10] Probably yes

3. [9] Uncertain

4. [66] Probably not

5. [27] Definitely not

IF DEFINITELY OR PROBABLY YES, BRIEFLY EXPLAIN YOUR RESPONSE.

ENDOWMENTS AND GIFTS FOR RESEARCH PROGRAMS AND FACILITIES

20. Has any foreign source (government, business, nonprofit or other organization, or a consortium that includes foreign businesses) given your university an accumulated total of more than $500,000 for research programs, research facilities and/or research equipment since the start of FY 1984? (Check one.)

n=127

1. /107/ No

2. [20] Yes --> Specify source and amounts, departments in receipt, and the general use made of donations.

See Section III

21. Since the start of FY 1984, has a foreign source (government, business or other organization, or individual) endowed one or more chairs in agriculture, medicine, science, engineering, or mathematics at your university? (Check one.)

1. [121] No n=129

2. [8] Yes --> Check below the country/region of origin of chair endowers.

FOREIGN SOURCES	CHAIRS
a. Canada	
b. Japan	2
c. Other Far East countries (including China, Taiwan, and South Korea)	
d. United Kingdom	
e. West Germany	
f. Other Western European countries	
g. Israel	
h. Middle East (including Egypt)	2
i. Multinational businesses - country uncertain	
j. Other (SPECIFY REGION(S))	

Foreign sources were not identified for four chairs

UNIVERSITY PATENTING AND LICENSING DATA

22. Please provide the following statistics for your university in FY 1986.

a. Number of invention disclosures	3,105	n=120
b. Number of patent applications filed	1,149	n=117
c. Number of copyright applications filed for software programs	295	n=104
d. Number of inventions licensed	737	n=115
e. Number of licenses issued to U.S. businesses	688	n=115
f. Number of licenses issued to foreign businesses	66	n=113
g. Amount of royalty income from U.S. businesses	$ 27,741,936	n=112
h. Amount of royalty income from foreign businesses	$ 2,622,819	n=106

FEDERAL POLICY

23. In your opinion, should the federal government impose any restrictions on a universities' ability to solicit foreign sponsorship of R&D or universities' licensing of technologies to foreign organizations? (Check one for each.)

See p. 39.

A. Soliciting of R&D Sponsorship By Foreign Organizations

1. [6] Definitely yes n=129
2. [11] Probably yes
3. [14] Uncertain
4. [42] Probably not
5. [56] Definitely not

Briefly explain your response.

See p. 39.

B. Licensing of Technology To Foreign Organizations

1. [7] Definitely yes n=127
2. [16] Probably yes
3. [21] Uncertain
4. [39] Probably not
5. [44] Definitely not

Briefly explain your response.

See p. 40.

24. In recent years, the federal government has encouraged collaboration and technology transfer between universities and U.S. businesses by actions such as giving universities rights to federally funded inventions, funding engineering research centers through the National Science Foundation, and the President's Executive Order 12591 on Facilitating Access to Science and Technology (April 10, 1987). In your opinion, are there any existing barriers to collaboration and technology transfer that could be addressed by federal initiatives? (Check one.)

1. [33] No n=128
2. [46] Uncertain
3. [49] Yes --> Please identify any initiatives you believe the federal government could take.

See p. 41.

BACKGROUND

25. Do your responses to this survey apply to your university unit alone or do they apply to additional units in a university system (multi-unit state system)? (Check one.) n=129

    1. [119] This university unit alone

    2. [10] Other units in system -> Identify additional units you have included.

26. Does your university obtain R&D funding from an independent organization associated with your university, such as a foundation or a medical school, that may receive foreign funding that is not reflected in your responses to this questionnaire? (Check one.)

    1. [116] No

    2. [14] Yes --> Specify the organizations and please call Mr. Cheston with a point of contact.

27. Please provide the name, title, and phone number of the individual who should be contacted if we need to clarify any response to this questionnaire or need additional information.

    Name _____

    Title _____

    Phone ( ) _____
    Area Number

28. In the space below, feel free to briefly describe foreign funded R&D projects at your university that provided substantial benefit to the advancement of science or to your university. Furthermore, if you have any additional comments regarding any of the topics covered in this questionnaire, please enter them below.

--> NOTE: USE THIS PAGE IF YOU ANSWERED YES TO QUESTION 7 ON PAGE 36 <--

7a. What is the name and country of origin of the foreign business with the agreement having a total dollar value of $500,000 or more?

Business Name _____

Country of Origin Japan, Spain, Italy, Peru, United Kingdom, Switzerland, Somalia

7b. When was the contract signed? /__/__/__/__/__/__/
mo. day yr.

7c. What is the general field of science involved?
Field Cancer research, meteorology, chemistry, low molecular weight agents, recombinant DNA, medicine, aerodynamics, polymer science, pharmaceuticals, agriculture

7d. What university department(s) is (are) involved?
Department(s) Range Management and Plant Sciences; Biochemistry, Pharmarology, Anatomy, Institute for Polymers and organic solids.
Cellbiology, Mechanical Engineering, Chemistry, Medicine, Soil Science, Microbiology, Biology, Space Science and Engineering, Center for Cancer Research

7e. How many years is the agreement for? (Base period plus any exercised extension.)

Years length of agreements ranged from 3 to 20 years

7f. What is the total amount of money and/or value of equipment that the business will contribute under the agreement? (Your best estimate will be sufficient.)

$ 127 million

7g. Does the business have any title rights to resulting inventions, software, or other technology under the agreement? (Check one.)

1. [7] **No**
2. [5] **Yes --> Specify rights.** Right to license, exclusive rights to computer codes.

7h. What licensing rights for resulting technology under the agreement does the business receive? (Check one.)

1. [4] **Exclusive**
2. [3] **Partially exclusive**
3. [2] **Nonexclusive**

7i. In addition to any title or licensing rights, does the business have other rights under the agreement such as access to labs, review of publications, delay of publication, etc.? (Check one.)

1. [3] **No**
2. [10] **Yes --> Specify rights.** Review of publications; access to laboratories, minority seats on the board of directors for this project only.

Question No. 12

We are interested in knowing whether a typical foreign business' approach to university research is similar to or different from the approach of a typical U.S. business. For each area listed, please indicate whether or not you perceive there is a difference and specify the nature of the difference.

(Of the universities perceiving differences, the most frequent responses are reported below.)

12a. Interest in funding long-term versus short-term R&D.

- 8 universities reported that foreign companies tend to show greater interest in funding long-term R&D.

12b. Willingness to allow the university's investigator discretion to select the research project within a general research area versus funding a specific, narrowly defined project.

- 8 universities reported that foreign firms tend to support narrowly defined research projects.

12c. Requests to delay research publications.

- Responses were too diverse to generalize.

12d. Business' management and/or scientists are likely to visit the campus to discuss the research.

- 5 universities reported that foreign companies are more likely to visit the university.

12e. The business sends its scientists to work at the university's laboratory.

- 7 universities reported that foreign businesses will send its scientists to work at the university's laboratory more frequently.

12f. Interest in supporting graduate students as part of the research team.

- 4 universities reported that foreign firms are less likely to support graduate students as part of a research team.

12g. The business (1) provides funds or donates equipment for the research and/or (2) provides funds for equipment maintenance or for space renovation to house equipment.

- 4 universities reported that foreign firms are less likely to fund or donate equipment, and less likely to provide funds for equipment maintenance.

Question No. 17a

Does your university have any formal policies that distinguish between U.S. and foreign businesses regarding the receipt of foreign funding?

Question No. 17b

Does your university have any formal policies that distinguish between U.S. and foreign businesses regarding the licensing of university inventions to foreign businesses?

Question No. 18

In your opinion, are there typically any differences in your university's process for reviewing an R&D agreement negotiated with a foreign business versus a U.S. business?

Question No. 19

In your opinion, are there any major differences between contract terms that your university has typically negotiated or would negotiate with a foreign business versus a U.S. business?

(Because of the overlap in replies, responses to questions 17 to 19 have been combined. The aggregate results follow.)

- 20 universities reported payment concerns such as: requiring advance payment of the full amount in U.S. dollars, (for 10 of these universities, this was the only distinction they reported making between U.S. and foreign sources);
- 12 universities reported that they ensure that research agreements comply with U.S. export control regulations and other laws;

- 12 universities reported that they subject foreign funding to greater scrutiny in general (i.e., review agreements for specific legal provisions or governing language) and/or approval through different review channels than domestic funding;
- 7 universities reported giving preference to U.S. companies when licensing university-developed inventions;
- 4 universities reported concerns over patent and licensing rights of foreign sponsors;
- 2 universities reported that foreign agreements must be filed with university or state officials while similar U.S. business agreements do not have this requirement; and
- 5 responses were too diverse to generalize.

Question No. 23a

Should the federal government impose any restrictions on a university's ability to solicit foreign sponsorship of R&D?

(Response categories were derived through a content analysis. Several universities provided more than one narrative response.)

- 21 universities stated that no restrictions should be imposed other than to protect national security;
- 17 universities stated that the imposition of restrictions would constrain research—knowledge should not be confined by national boundaries;
- 12 stated that universities, and not the government, should determine sources of funding;
- 7 universities stated that foreign sponsorship of university R&D is an alternate source of funding, and instead of being restricted, should be encouraged;
- 6 universities stated that existing regulations are sufficient;
- 4 universities stated that enforcement of regulations would be difficult because of definitional or other administrative problems;
- 3 universities stated that they should not be singled-out when dealing with foreign organizations—they should be treated the same as private industry; and
- 8 responses were too diverse to generalize.

Question No. 23b

Should the federal government impose any restrictions on a university's ability to license technology to a foreign organization?

(Response categories were derived through a content analysis. Several universities provided more than one narrative response.)

- 15 universities stated that no regulations should be imposed other than those that protect national security;
- 11 universities stated that certain licensing restrictions are desirable;
- 11 universities stated that additional licensing restrictions are unnecessary as existing regulations are sufficient;
- 10 universities stated that preference in licensing is already given to U.S. firms;
- 8 universities stated that they should be allowed to seek out foreign licensees if U.S. firms do not show an interest in a technology;
- 8 universities stated that licensing restrictions would adversely affect technology transfer;
- 5 universities stated that new restrictions would be difficult to implement for administrative reasons;
- 3 universities stated that they should not be singled-out when dealing with foreign organizations—they should be treated the same as private industry;
- 2 universities stated that with certain technologies, e.g., pharmaceuticals, it is desirable to license to foreign firms; and
- 16 responses were too diverse to generalize.

Question No. 24

Are there any existing barriers to collaboration and technology transfer that could be addressed by federal initiatives?

(Response categories were derived through a content analysis. Several universities provided more than one narrative response.)

- 13 universities stated that greater protection should be extended to software and data;
- 12 universities stated that tax credits, particularly the R&D tax credits, should be extended to promote industry sponsorship of university research;
- 10 universities stated that administrative aspects of existing federal policies and programs should be improved. Examples reported include patent filing fees and educating administrators of federal agencies about applicable laws and regulations;
- 9 universities stated that the government should establish new funding mechanisms to support university research;

- 5 universities stated that collaborative research by industry should be protected from anti-trust actions;
- 5 universities stated that the federal government should provide ways to bridge the gap between basic research and development;
- 3 universities stated that Executive Order 12591 should be codified so that it applies to all laboratories and not just government-owned, contractor-operated facilities;
- 2 universities stated that application of federal "march-in" rights is a barrier to collaboration and technology transfer between universities and businesses;
- 2 universities stated that industry and universities should be protected from liability suits arising from their research; and
- 10 responses were too diverse to generalize.

Question No. 25

Do your responses to this survey apply to your university unit alone or do they apply to additional units in a university system (multi-unit state system)?

(The following is a list of universities that identified additional units of a university system as being included in their data.)

Cornell:
Data include medical school.

Texas A&M:
Data include Texas Agricultural Experiment Station, Texas Engineering Experiment Station, and Texas Transportation Institute.

New York University:
Data include medical school.

University of Pittsburgh:
Data include four regional campuses located in the towns of Johnstown, Bradford, Greensburg, and Titusville.

Rutgers:
Data include Rutgers College, Douglass College, Livingston College, Cook College, New Jersey Agricultural Experiment Station, Newark Campus, and Camden Campus of Rutgers University.

University of Hawaii:
Data include all nine campuses—community colleges and branch University of Hawaii campuses.

University of Illinois at Chicago:
Data include medical campuses at Peoria and Rockford.

University of South Carolina:
Data include eight branch campuses of the University of South Carolina.

Tufts:
Data include College of Liberal Arts; Human Nutrition Research Center; College of Engineering; Fletcher School of International Law & Diplomacy; Graduate School of Arts & Science; Schools of Medicine, Dental Medicine, Veterinary Medicine, and Graduate Biomedical Sciences; and Graduate School of Nutrition.

Medical University of South Carolina:
Data include the Health Science Foundation and the Drug Science Foundation.

In addition, the data reported for the University of Medicine and Dentistry of New Jersey include the combined responses of UMDNJ-New Jersey Dental School, UMDNJ-New Jersey Medical School, UMDNJ-Robert Wood Johnson Medical School, and UMDNJ-School of Osteopathic Medicine.

Universities Participating in the Survey

This appendix contains three lists. The first details those 27 universities that reported no foreign funds for R&D in FY 1986.

The second list contains the 107 universities reporting foreign funds, and their R&D expenditures by source as reported to GAO. For this list, the following definitions apply:

- GAO Rank: Rank of university according to total R&D expenditures in FY 1986 as determined by GAO questionnaire.
- NSF Rank: Rank of university according to total R&D expenditures in FY 1985 and FY 1986 as determined by NSF in an annual survey.[1]
- Total R&D Expenditures: University R&D expenditures from all sources (government, business, nonprofit, and other organizations).
- Int'l. R&D: Total expenditures for R&D funded by international agencies such as the World Bank.
- Foreign R&D: Total expenditures for R&D funded by all foreign sources (government, businesses, and nonprofit and other organizations).
- Foreign Business R&D: Total expenditures for R&D funded by all foreign businesses.
- U.S. Business: Total expenditures for R&D funded by all U.S. businesses.

The third list contains the R&D data of those universities whose survey responses arrived too late to be included in this analysis.

List No. 1 Universities Reporting No Foreign Funding for R&D in FY 1986

University of Maryland, College Park
University of Puerto Rico
Temple University
University of Maine
Iowa State University
University of Oregon
Lehigh University
University of California-Irvine
University of Rhode Island
Louisiana State University
University of Massachusetts-Worcester
U.S. Naval Postgraduate
Tennessee State University

(continued)

[1]Discrepancies between GAO and NSF rankings can be attributed to differences in survey design. The GAO survey asked universities for R&D expenditures in all fields, while according to a representative of NSF, the NSF survey asked universities to report only science and engineering data.

Union University
Howard University
University of Notre Dame
Mt. Sinai School of Medicine
George Washington University
Syracuse University
SUNY Health Science Center
University of New Hampshire
Medical College of Wisconsin
Colorado State University
University of Idaho
Brandeis University
Case Western Reserve University
Boston University

List No. 2 University R&D Expenditures by Source From Those Institutions Reporting Foreign Funding

GAO rank, FY 86	University	NSF rank, FY 85	NSF rank, FY 86	Total R&D	Int'l. R&D	All foreign R&D	Foreign business	U.S. business
1	MIT	2	2	$256,096,000	$55,000	$5,304,000	$5,207,500	$31,100,000
2	U of Wisconsin	3	3	231,000,000	450,000	2,380,000	2,130,000	11,000,000
3	Stanford U	5	5	218,219,245	38,076	561,685	523,609	8,051,086
4	Cornell U	4	4	216,285,585	151,511	244,914	72,000	14,590,933
5	Harvard U	14	14	185,688,400	66,846	10,781,353	518,241	a
6	U of Michigan	8	7	182,399,792	a	449,630	377,057	17,778,972
7	Texas A & M U	11	11	165,400,000	0	15,200,000	201,000	9,950,000
8	Johns Hopkins U	1	1	164,914,200	561,035	2,118,463	a	8,026,097
9	U of Calif-LA	10	9	160,402,000	49,000	782,000	394,000	7,015,000
10	U of Washington	7	8	159,815,025	173,902	2,067,881	792,723	10,170,617
11	Pennsylvania State U	20	17	151,196,000	0	673,000	467,000	17,407,000
12	U of Pennsylvania	17	15	142,392,000	83,000	228,000	228,000	6,925,000
13	U of Calif-San Diego	12	10	138,900,000	78,872	727,524	702,071	5,293,000
14	U of Minnesota	6	6	126,000,000	147,418	267,892	165,898	9,007,496
15	U of Arizona	22	20	124,790,000	0	585,906	585,906	10,572,094
16	Yale U	21	22	122,000,000	24,000	194,000	170,000	1,843,000
17	U of Ill at Urbana	13	13	119,618,507	48,350	205,737	0	6,981,851
18	U of Texas at Austin	18	19	119,610,680	3,028	752,373	728,780	10,870,434
19	U of Southern Calif	24	25	117,708,000	0	30,000	a	6,147,000
20	U of Calif-Berkeley	9	12	114,786,791	20,869	186,808	98,066	3,765,252
21	U of Florida	28	29	107,456,159	0	558,032	25,850	8,422,595
22	Georgia Inst of Tech	29	27	101,957,000	0	1,686,056	140,479	22,134,784

(continued)

GAO rank, FY 86	University	NSF rank, FY 85	NSF rank, FY 86	Total R&D	Int'l. R&D	All foreign R&D	Foreign business	U.S. business
23	U of Calif-Davis	19	21	100,723,000	322,118	1,382,042	32,131	10,773,991
24	Columbia U	15	18	99,000,000	163,400	89,000	56,100	5,825,700
25	U of Rochester	32	32	95,824,000	0	479,280	457,825	6,256,175
26	Ohio State U	23	23	92,709,000	410,000	267,000	175,000	8,149,000
27	New York U	33	33	92,152,015	305,200	517,203	409,703	6,692,515
28	Baylor College of Med	48	51	85,000,000	0	105,843	105,843	3,002,420
29	Purdue U	31	30	80,733,848	a	1,812,409	a	a
30	Oregon State U	38	43	80,000,000	0	4,056,394	901,419	2,284,738
31	U of Alabama	67	57	74,000,000	12,000	1,500,000	1,500,000	5,900,000
32	U of North Carolina	41	38	73,504,000	93,000	69,000	69,000	1,021,000
33	U of Pittsburgh	47	45	71,504,896	0	408,179	353,497	9,972,358
34	Carnegie-Mellon U	50	49	70,587,731	0	14,356	14,356	17,388,644
35	Washington U	35	35	69,027,471	54,987	95,268	92,703	3,356,112
36	U of Iowa	46	46	65,541,000	0	308,494	223,654	3,698,765
37	VA Polytechnic Inst	49	44	65,535,344	26,913	133,413	106,500	6,463,000
38	U of Utah	57	56	65,000,000	a	a	182,000	4,500,000
39	U of Texas System	55	54	63,318,000	0	540,000	459,000	4,636,000
40	Yeshiva U	44	50	60,419,295	48,840	133,839	133,839	1,379,579
41	Northwestern U	4	39	59,482,478	23,173	51,285	25,597	2,230,419
42	North Dakota State U	111	114	55,000,000	0	35,000	35,000	2,310,000
43	U of TX Health-Dallas	68	69	55,000,000	0	100,000	0	3,922,000
44	U of Colo-Boulder	26	28	54,000,000	0	22,688	0	2,153,504
45	New Mexico State U	69	70	53,313,748	0	279,550	279,550	12,059,592
46	Rockefeller U	52	55	52,290,191	190,787	248,153	125,519	13,414,152
47	U of Miami	53	53	46,946,226	0	48,758	48,758	a
48	U of Nebraska	64	64	46,577,000	0	177,445	177,445	1,927,000
49	U of Missouri	61	59	43,987,708	0	190,162	126,018	6,032,596
50	VA Commonwealth U	86	91	43,707,957	0	166,858	129,858	3,552,205
51	U of MD-Baltimore	125	116	43,582,196	129,786	31,430	5,730	4,540,768
52	Woods Hole Ocean Inst	77	82	43,041,365	10,000	92,455	40,653	652,999
53	U of Georgia	34	24	41,202,326	28,528	230,813	127,813	2,540,711
54	Utah State U	83	84	40,445,934	0	998,943	0	1,873,789
55	Kansas State U	84	85	40,362,862	0	46,788	46,788	613,217
56	U of Massachusetts	82	78	40,291,733	199,000	430,441	175,990	5,248,983
57	U of Connecticut	37	48	38,989,000	a	100,000	100,000	2,557,304
58	Clemson U	89	87	38,963,000	0	82,339	22,356	2,596,572
59	Florida State U	87	80	38,607,644	0	53,594	0	706,211
60	Washington State U	71	83	38,400,000	a	82,477	82,477	2,123,524
61	Tufts U	129	128	37,558,685	0	119,023	90,053	1,056,406

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GAO rank, FY 86	University	NSF rank, FY 85	NSF rank, FY 86	Total R&D	Int'l. R&D	All foreign R&D	Foreign business	U.S. business
62	SUNY at Buffalo	54	52	37,381,895	62,100	1,908,404	25,000	a
63	U of Calif-SB	91	90	37,380,682	0	352,163	348,128	3,145,000
64	U of Cincinnati	78	79	36,292,720	0	25,755	6,500	2,205,507
65	U of Ill-Chicago	63	65	36,197,144	178,866	457,822	412,165	1,485,258
66	NC State U	39	34	34,011,363	0	691,224	105,938	9,015,496
67	U of Hawaii	58	62	32,958,753	a	543,267	460,160	762,775
68	U of TX Health-Hous	103	96	32,563,579	24,944	526,577	501,122	7,709,475
69	Emory U	90	72	32,000,000	0	136,657	a	a
70	Brown U	95	98	31,868,295	90,624	109,908	109,908	3,500,000
71	U of Tenn-Knoxville	132	129	31,400,000	a	67,307	56,407	3,000,000
72	Rutgers U	51	40	31,131,129	a	60,092	47,969	1,621,700
73	U of New Mexico	72	74	30,000,000	0	121,000	121,000	566,815
74	Wayne State U	98	93	28,900,000	0	0	45,000	2,097,000
75	Georgetown U	99	102	28,861,000	113,713	729,676	535,191	2,059,227
76	U of Dayton	104	106	26,817,568	a	35,510	27,510	2,786,000
77	U of Oklahoma	79	89	26,480,290	a	244,302	195,547	1,006,723
78	Dartmouth College	116	111	24,721,300	0	136,006	65,042	1,895,963
79	U of Texas Health-SA	92	95	24,365,982	0	614,738	614,738	5,000,000
80	U of SC	113	112	24,000,000	0	150,000	150,000	3,000,000
81	U of VT & ST Ag College	100	101	24,000,000	0	31,000	29,000	929,000
82	U of Alaska-Fairbanks	94	105	21,700,000	0	34,944	0	1,700,000
83	Rensselaer Poly Inst	117	119	21,043,022	65,069	135,030	69,961	5,816,900
84	U of TX-Med Brnch-Gal	109	109	20,814,356	1,461	27,609	27,609	1,018,532
85	U of Med & Dent of NJ	108	100	20,514,464	a	118,386	104,295	1,636,308
86	Tulane U	97	92	19,752,079	0	79,216	79,216	3,540,940
87	Arizona State U	93	94	19,654,000	17,300	23,800	22,600	2,887,600
88	U of Delaware	107	103	19,618,468	0	282,601	282,601	1,450,367
89	U of Houston-Univ Pk	134	115	19,585,594	a	330,044	206,914	1,843,372
90	Oregon Health Sci U	124	118	18,772,093	0	384,623	78,775	514,369
91	Rice U	139	143	17,056,000	0	74,503	74,503	1,346,185
92	S. Ill U-Carbondale	121	126	16,875,583	0	8,151	0	2,120,798
93	U of Calif-Santa Cruz	128	134	16,170,879	a	47,528	a	170,775
94	Texas Tech U	120	110	16,019,656	265,410	13,324	13,324	2,495,613
95	U of Wyoming	133	127	16,000,000	288,936	1,201,398	912,462	14,798,602
96	U of Tennessee-HC	137	130	14,921,039	a	52,570	52,570	746,052
97	U of Ark-Fayetteville	105	104	14,075,710	1,695,951	2,343,555	647,604	2,648,149
98	Thomas Jefferson U	149	154	13,293,731	18	114,459	112,087	2,865,300
99	U of Denver	110	148	11,778,837	5,978	41,902	40,937	1,162,273
100	Drexel U	150	145	11,164,000	0	32,700	14,700	2,940,000

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GAO rank, FY 86	University	NSF rank, FY 85	NSF rank, FY 86	Total R&D	Int'l. R&D	All foreign R&D	Foreign business	U.S. business
101	Suny Upstate Med Ctr[b]	122	132	10,067,848	0	190,820	190,820	466,732
102	Mississippi State U	80	81	9,521,334	0	17,700	0	2,111,798
103	Med U OF SC	142	125	2,736,492	37,540	247,826	247,826	2,481,061
104	U of Kentucky	66	66	a	14,500	132,500	132,500	1,417,310
105	U of Calif-Riverside	74	77	a	316,093	0	0	1,292,317
106	U of Virginia	59	61	a	a	a	a	a
107	Duke U	42	41	a	a	a	a	a

[a]No response.

[b]Name changed in 1986 to SUNY Health Science Center.

List No. 3 R&D Expenditure Data by Source for Universities Whose Responses Arrived Too Late to Be Included in the Body of This Report

University	Total R&D	Int'l. R&D	All foreign	Foreign business	U.S. business
Vanderbilt	$60,112,922	$0	$533,542	$533,542	Unavailable
Hahnemann	8,429,685	0	28,656	0	2,045,850
Oklahoma State[a]					

[a]Reported no foreign funding.

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