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ABSTRACT

The primary purpose of this study is to investigate relationships between trends in federal funding of biomedical-behavioral research in universities and concurrent financial and educational changes in these institutions from FY 1964 through FY 1974. More detailed knowledge of these interrelationships should provide guidance to federal agencies and to universities in their efforts to sustain academic research in health fields at a high level of national effectiveness. The analytical framework for the investigation involved two modes of trend comparisons: (1) differences among various types of institutions in patterns of change in a given financial or educational variable; and (2) concurrent changes in two or more variables for a given type of institution. The sample included 148 institutions classified by type of control; medical school status; and involvement in doctoral education and research. Variables analyzed included: educational and general revenues; proportion of revenues supplied by R and D funds; trends in sponsored R and D revenues for all fields; expenditures for biomedical-behavioral research; enrollment trends; and trends in doctoral degrees. The general conclusion, although not conclusive, is that the financial condition of private research universities has been deteriorating under the impact of cost inflation and recession in revenues. (JMF)

A STUDY OF FINANCIAL AND EDUCATIONAL TRENDS IN RESEARCH UNIVERSITIES IN RELATION TO FEDERAL FUNDING OF HEALTH-RELATED RESEARCH: 1964-1974

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ACE SPECIAL REPORT

AMERICAN COUNCIL ON EDUCATION

A STUDY OF FINANCIAL AND EDUCATIONAL TRENDS IN UNIVERSITIES IN RELATION TO FEDERAL FUNDING OF HEALTH-RELATED RESEARCH 1964-1974

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I. INTRODUCTION

The general purpose of this study has been to investigate dimensions and trends in federal funding of biomedical-behavioral research in universities over the period from 1963-64 through 1973-74 in relation to concurrent trends in the overall financial and educational operations of these institutions. Sponsored by the President's Biomedical Research Panel, it is part of a more comprehensive project on the impacts of health-related research expenditures upon the financial status, instructional programs, faculties, and educational outputs of universities and academic medical centers.

The Panel defined the specific nature and scope of its interest in the present study in the form of a set of six questions, which are reproduced in Table 1 on the following page. They fall generally into two groups: (a) questions pertaining to financial trends and their interrelationships in research universities, with special reference to the funding of health-related research; (b) questions concerned with concurrent trends in the educational resources and activities of these institutions.

The American Council on Education has undertaken a comprehensive program of statistical investigation in an effort to answer these specific questions and, insofar as available data would permit, to address the more general issues raised in the Panel's background statement of its premises and purposes. A sample of institutions was first established which included all U.S. universities with medical schools and a matching group without medical schools. Together they comprise all institutions classified by the Carnegie Commission on Higher Education as "research universities" and most of the remainder that award doctoral degrees. Data were then sought for the institutional sample that would

Table 1. Questions Raised by the President's Biomedical Research Panel Regarding Dimensions and Trends in Research Funding in Universities

1. What is the total educational and general revenue of universities?

2. What part of the above is provided for:

   a. sponsored research (all funding sources)?
   b. federal R&D projects (all agencies)?
   c. federal biomedical and behavioral research projects?
   d. non-federal R&D projects?

3. What part of funding of new construction and renovation has been provided by federal sources? Non-federal sources? What part of each of the preceding has been for biomedical and behavioral research?

4. What trends in funding have occurred with the following instruments for the transfer of NIH and ADAMHA funds to universities through:

   a. regular research grants?
   b. program project grants?
   c. center grants?
   d. contracts?
   e. training grants?
   f. faculty awards?
   g. general research grants?
   h. clinical research centers?
   i. construction and renovation grants and loans?
   j. National Library of Medicine awards?
   k. other?

5. To the extent that data are available from other federal agencies, similar breakouts as they apply to biomedical and behavioral research shall also be studied.

6. Between the years 1964 through 1974, what changes have there been in faculties and students in:

   a. total student enrollment?
   b. graduate student enrollment?
   c. biomedical and behavioral student enrollment?
   d. number of biomedical and behavioral postdoctoral students?
   e. number of graduate assistants?
   f. graduate degrees granted, by fields?

permit the kinds of analyses required to provide answers to the Panel's questions. Because of the project's original duration (eight months), however, it was necessary to limit the data base to statistical information already available in the files of federal and private agencies.

It turned out that these sources either had no data or entirely inadequate data relative to certain of the questions. Furthermore, even when the types of data appeared to be satisfactory, most of the files were deficient in one or more of the following respects: (a) failure to cover the full period under study (FY 1964 through FY 1974); (b) incompatibility between earlier and later records in a series due to questionnaire changes (e.g., varying definitions of an item); (c) changes in the institutional composition of the reporting units (mainly in the case of multicampus universities); (d) institutional data missing for one or more of the years covered by a given data series; (e) inconsistencies among sources in reporting data for ostensibly the same variable.

Despite these limitations, it was possible to discover significant trends and interrelations among the data that were available and usable. Such findings include differences in several dimensions between various subdivisions of the total institutional sample: private vs. public control; presence vs. absence of a medical school; the hierarchical categories developed by the Carnegie Commission on Higher Education.

The questions in Table 1 for which no relevant trend data could be found were the following: (a) item 3 on the sources and purposes of funding for new construction and renovation; (b) item 5 on trends in federal support by funding mechanisms for agencies other than NIH and ADAMHA; (c) numbers of faculty members, graduate assistants, and postdoctoral students by discipline.

II. PROCEDURE

Three general types of procedures will be described: (a) selection of the sample of universities; (b) construction of the data base; (c) analytical techniques and modes of presenting results.

Sample of Institutions

As a point of departure for selecting the ACE sample, it was decided to include all university campuses with medical schools within their organizational structure and jurisdiction (whether or not physically located on the campus).

In selecting a parallel group of universities without medical schools, the initial intention was to limit them to the top three categories of institutions in the classification hierarchy devised by the Carnegie Commission on Higher Education: Research Universities I, Research Universities II, and Doctoral Universities I. Some 87 per cent of all universities with medical schools on campus (as defined above) fell within these three groups, and the few institutions with medical schools not classified among the top three categories appeared to be difficult to "match" precisely with "non-medical-school" counterparts. But it was finally decided to include four public campuses without medical schools from other categories--mainly because they were members of multi-campus institutions which earlier had reported only aggregated data for all its campuses, and it seemed desirable to maintain the continuity of such aggregates for possible use in certain of the analyses.

The top five categories of the classification developed by the Carnegie Commission, from which the sample for Task 1 was drawn, are defined in terms of the following criteria:[1]

Research Universities I. The 50 leading universities in terms of federal financial support of academic science in at least two of the three academic years, 1968-69, 1969-70, and 1970-71, provided they awarded at least 50 Ph.D.'s (plus M.D.'s if a medical school was on the same campus) in 1969-70. Rockefeller University was included because of the high quality of its research and doctoral training, although it did not meet these criteria.[2]

Research Universities II. These universities were on the list of the 100 leading institutions in terms of federal financial support in at least two out of the above three years and awarded at least 50 Ph.D.'s (plus M.D.'s if a medical school was on the same campus) in 1969-70, or they were among the leading 50 institutions in terms of the total number of Ph.D.'s (plus M.D.'s if on the same campus) awarded during the years from 1960-61 to 1969-70. In addition, a few institutions that did not quite meet these criteria, but that have graduate programs of high quality and with impressive promise for future development, have been included in Research Universities II.

Doctoral-Granting Universities I. These institutions awarded 40 or more Ph.D.'s in 1969-70 (plus M.D.'s if on the same campus) or received at least $3 million in total federal financial support in either 1969-70 or 1970-71. No institution is included that granted fewer than 20 Ph.D.'s (plus M.D.'s if on the same campus), regardless of the amount of federal financial support it received.

Doctoral-Granting Universities II. These institutions awarded at least 10 Ph.D.'s in 1969-70, with the exception of a few new doctoral-granting institutions that may be expected to increase the number of Ph.D.'s awarded within a few years.

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[1] Carnegie Commission on Higher Education. A Classification of Institutions of Higher Education. A Technical Report. Berkeley, Calif.: Carnegie Commission on Higher Education, 1973.

[2] The term "Ph.D." in these definitions includes the Ed.D. and other doctoral degrees (but not M.D.'s, D.D.S.'s, etc.).

Comprehensive Universities and Colleges I. This group includes institutions that offered a liberal arts program as well as several other programs, such as engineering and business adminstration. Many of them offered master's degrees, but all lacked a doctoral program or had an extremely limited doctoral program. All institutions in this group had at least two professional or occupational programs and enrolled at least 2,000 students in 1970. If an institution's enrollment was smaller than this, it was not considered comprehensive.

The "three-dimensional" distribution of the numbers of institutions in the sample is presented in Table 2 on the following page: (a) by Carnegie Commission category; (b) by presence or absence of a medical school; and (c) by type of control (private, public). The last section of the table shows the corresponding numbers of universities in the national population of such institutions, with breakdowns by type of control. A comparison between the sample and the population totals shows that the original intention to include in the sample all institutions from the top three Carnegie Commission categories was not quite realized. Missing are three of the 52 Research Universities I and six of the 53 Doctoral Universities I. Of the missing nine institutions, two are private and seven are public. All omissions were due to excessive incompleteness or unusability of records.

The sample of 148 universities received more than 80 per cent of all federal funds obligated for research and development according to the National Science Foundation's data for FY 1972. Specific percentages were: total R&D for all fields, 83%; total R&D for life sciences, 81%; total R&D for psychology, 84%.

Table 2. Distribution of the Numbers of Institutions in the ACE Sample by (a) Carnegie Commission Classification, (b) Presence or Absence of a Medical School, and (c) Type of Control

Carnegie Commission Classification[a]	Institutions Included in the ACE Sample									Institutions in the National Population		
	Institutions with Medical Schools[b]			Institutions without Medical Schools			All Institutions in the Sample					
	Private	Public	Total	Private	Public	Total	Private	Public	Total	Private	Public	Total
Research Universities I	18	18	36	4	9	13	22	27	49	22	30	52
Research Universities II	6	8	14	7	19	26	13	27	40	13	27	40
Doctoral Universities I	5	5	10	12	25	37	17	30	47	19	34	53
Doctoral Universities II	0	3	3	0	1	1	0	4	4	12	18	30
Comprehensive Universities and Colleges I	3	2	5	0	3	3	3	5	8	100	234	334
Total	32	36	68	23	57	80	55	93	148	166	343	509

[a]The Carnegie Commission on Higher Education included the following categories in its classification of colleges and universities:

1. Research Universities I
2. Research Universities II
3. Doctoral Universities I
4. Doctoral Universities II
5. Comprehensive Univ. & Colleges I
6. Comprehensive Univ. & Colleges II
7. Liberal Arts Colleges I
8. Liberal Arts Colleges II
9. Two-Year Colleges
10. Specialized Institutions

The classification criteria for the five categories used in the ACE sample are described in the text.

[b]This group includes only institutions with medical schools located on the same campus or else under the campus jurisdiction.

Composition of the Data Base

As noted in the Introduction, the information used in this study was limited to data already existing in the files of various federal agencies and private organizations. Two general types of data were assembled: financial statistics; educational and personnel statistics. The number of data elements in both categories totaled more than 150, which were compiled from computer tapes and hard-copy records provided by the following sources:

1. National Center for Education Statistics (NCES)
2. National Science Foundation (NSF)
3. National Institutes of Health (NIH)
4. Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA)
5. National Academy of Sciences-National Research Council (NAS-NRC)
6. American Association of University Professors (AAUP)

The general categories of data supplied by these organizations are indicated in Table 3 on the following page, which is divided into two sections: (a) financial statistics, from three agencies; (b) non-financial statistics, from four agencies.

With 148 institutions in the sample, if each one had supplied all of the desired data elements for the 11 years covered by the study the data base would have had a total of about a quarter of a million statistical items. Unhappily, the actual number fell far short of that theoretical figure for reasons already cited: (a) most of the surveys did not span the entire 11-year period, and some that did were conducted intermittantly; (b) in certain surveys, changes in the definition of the data elements occurred, including the level of aggregation; (c) many institutions did not supply all of the data requested; (d) changes in the composition of the reporting unit in the case of several multicampus institutions (e.g., aggregate data for all campuses in a system were reported for certain years and for other years reports by individual campuses were submitted).

Table 3. Classification of Types and Sources of Data Included in the ACE Data Base for Universities[a]

I. Financial Statistics

A. National Center for Education Statistics

1. Educational & General Revenues
   - Total (nonfederal, federal)
   - Sponsored research (nonfederal, federal)
   - Indirect Cost (total, sponsored research)
2. Fund Additions for Buildings & Equipment

B. National Science Foundation

1. Federal Obligations for Science
   - FY 1964 to FY 1970 (aggregate data)
   - FY 1971 to FY 1974 (data by fields)
2. Expenditures for Research
   - Total research funds by fields
   - Federal research funds by fields

C. National Institutes of Health (IMPAC System)

1. By Fields and "Funding Mechanisms"
2. By Direct and Indirect Cost

II. Non-Financial Statistics

A. National Center for Education Statistics

1. Enrollment (Total, Graduate by Fields)
2. Doctoral Degrees by Fields

B. National Science Foundation

1. No. of Scientists and Engineers by Field
2. No. of Graduate Assistants by Fields

C. National Research Council

1. Doctoral Degrees by Fields
2. Postdoctoral Plans of Doctoral Recipients
3. Federal Postdoctoral Support

D. American Association of University Professors

1. No. of Full-Time Faculty
2. Faculty Salaries by Rank

[a]After the data from these various sources had been assembled and examined, some of the variables were judged to be either not useable or not useful in the analyses. The data used will be described in each section of the discussion of results.

It is interesting to note that only three sets of data spanned the entire 11-year period: the NSF-CASE series (total federal obligations for academic institutions); the NCES series on earned doctoral degrees by disciplines; AAUP series on faculty salaries and size. In the last case, there has never been a breakdown of the data by academic disciplines, while such a breakdown wasn't introduced into the NSF-CASE series until FY 1971.

Analytical Methods

The general procedure followed in treating the data may be described as "trend analysis," which involved two modes of comparisons of changes over time in measures of educational variables: (a) differences among various types of institutions in the trend for a given variable; (b) concurrent trends among two or more variables for a given type of institution. Combinations of both modes of trend analysis were also employed within a single set of comparisons.

Three types of statistical measures or indices of changes in the financial and educational variables were used:

The arithmetic mean. With some reservations, this measure of central tendency for the distributions of all of the variables was selected in preference to the median. Despite being subject to undue influence by extreme scores in skewed distributions, means and their accompanying standard deviations posed simpler computational problems and reflected more precisely the actual magnitudes and dispersions of the institutional "scores" on the several variables.

In computing the means for the successive years in a trend series, it was decided to use the same number of cases throughout--even though this meant the discarding of data for substantial numbers of institutions. For example, in the case of NCES' HEGIS data, only 100 of the 148 institutions in the sample had complete records for all of the financial variables used. This was the greatest reduction required for any variable used in the analysis, however, and the 100 universities included 93 (64 per cent) of the 145 institutions comprising the population of the top three Carnegie Commission categories. It is believed that population proportions as high as this (or higher) have yielded means sufficiently reliable for the kinds of trend comparisons undertaken in this study.

In order to check directly on the kinds of variations that might result from using different numbers of institutions with different variables, the principal analyses were duplicated with data from the residue of 63 institutions (34 private and 29 public) whose records were complete for all variables and relevant years. Unfortunately, this reduced sample of 63 universities was quite unrepresentative of the original 148, since it contained 62 per cent of the private but only 31 per cent of the public institutions shown for the total sample in Table 2. Nevertheless, the trend patterns for the means for "All Institutions Combined," "All Private Institutions" and "All Public Institutions" showed reasonably good agreement with those derived from the larger samples. Further breakdowns into sub-classes of institutions produced such small numbers of cases that the variability increased considerably.

Index numbers. For purposes of comparing trends in the means for different groups or for variables with different units, it seemed desirable to have a "common-denominator" to which the various trend series could be reduced. For this purpose, an index-number series was created for each variable by selecting a base year and expressing the means for all other years in the series as percentages of the mean for the base year (multiplied by 100). The year 1971-72 was chosen as the base year for all trend series, and its mean in each case was assigned the index value "100."

Percentage comparisons. Several of the questions posed by the Panel called for the calculation of percentage relationships between a given variable and a reference variable. For example: "What proportion of the educational and general revenues of universities is provided from federal R&D funds?" Such relationships expressed as percentages may be assumed to be generally comparable from year to year in a series, for the same group of institutions.

Price Indices

In attempting to assess the impact of federal R&D funding upon universities, it seemed highly important to take into account the effects of inflation upon the financial trends under study. For this purpose, four series of price indices have been used as deflators--each appropriate to a given type of expenditure:

1. Halstead's Higher Education Price Index[3]
2. Halstead's Construction Price Index[3]
3. Halstead's Equipment Price Index[3]
4. The NIH R&D Price Index[4]

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[3]D. Kent Halstead, Higher Education Prices and Price Indexes. Washington, D.C.: U.S. Government Printing Office, 1975.

[4]The NIH R&D deflator was recently developed by Westat, Inc. under contract with the National Institutes of Health.

Price-index series have been compiled for all four of these deflators--using the FY 1964 as the base year. They are presented in Table 4 below, together with parallel series for the Consumer Price Index and the Wholesale Price Index. The latter two series have been derived from data published in the Economic Report of the President, 1975 and in Economic Indicators published by the Council of Economic Advisors. Since both federal series are stated on a calendar-year basis (except for the current year, when monthly or quarterly figures are given), they have been converted to a fiscal-year basis by averaging values for continguous calendar years.

Table 4. Price Deflators for Four Types of Higher-Education Expenditures, together with the Consumer Price Index and the Wholesale Price Index

Fiscal Year	Halstead Higher Ed. Price Index	Halstead Construction Price Index	Halstead Equipment Price Index	NIH R&D Price Index	Consumer Price Index	Wholesale Price Index
1964	100.0	100.0	100.0	100.0	100.0	100.0
1965	104.3	103.0	100.2	102.6	101.5	101.2
1966	109.5	106.8	101.3	106.5	103.9	103.8
1967	115.2	111.9	105.2	111.2	106.8	105.6
1968	122.1	120.0	108.4	117.6	110.6	107.1
1969	130.4	129.2	111.3	124.0	115.9	110.5
1970	139.4	138.7	116.1	130.9	122.5	114.7
1971	148.3	150.7	121.5	138.5	128.7	118.6
1972	156.5	163.0	124.0	144.3	133.6	123.2
1973	164.5	173.2	127.8	150.5	140.0	134.1
1974	176.0	184.9	137.8	160.2	152.1	155.8

III. TRENDS IN TOTAL EDUCATIONAL-AND-GENERAL REVENUES

The term "educational-and-general revenues" designates the total income of an academic institution from all sources for its regular educational operations and their support functions. These and other financial data are collected annually by the National Center for Education Statistics (NCES) in one of its Higher Education General Information Surveys (HEGIS).

Excluded from the category of "Educational-and-General Revenues" in the HEGIS financial survey are funds for such purposes as student aid, auxiliary enterprises, and "major service programs" (e.g., hospital operations or Federally Funded Research and Development Centers).[5]

Trends in E&G Revenues in Constant Dollars

The general paradigm for presenting most of the financial results of this study is illustrated in Tables 5 and 5A on the following page. Mean E&G revenues by type of institution in thousands of constant dollars are shown in Table 5--for the six fiscal years 1969 through 1974. It was decided as a general rule to omit parallel tables showing means in current dollars, partly to save space, but mainly to focus attention on the financial condition of the institutions, which is best represented by trends in "real-dollar" equivalents. Moreover, the current-dollar mean values may be derived from the constant-dollar means through multiplication by the appropriate price-index values shown in Table 4.

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[5] Prior to FY 1969, NCES included funds for Federally Funded Research and Development Centers in the E&G category under "sponsored research". This meant that the E&G revenue data supplied by NCES for FY 1966 through 1968 could not be used in the present study because of incompatibility with later data.

Table 5. Trends in Mean Educational-and-General Revenues by Type of Institution--Constant Dollars in Thousands (Halstead HEPI as Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Institutions	100	$34,947	$36,312	$37,085	$37,942	$37,933	$38,816
All Private Institutions	46	36,907	37,158	37,388	38,814	37,410	37,627
With Medical Schools	26	47,935	48,507	48,957	51,574	50,003	50,307
Without Medical Schools	20	22,569	22,406	22,347	22,225	21,040	21,143
All Public Institutions	54	33,277	35,591	36,827	37,199	38,378	39,829
With Medical Schools	24	47,795	50,834	51,369	51,969	53,328	54,518
Without Medical Schools	30	21,663	23,396	25,194	25,382	26,418	28,077
All with Medical Schools	50	47,868	49,624	50,115	51,764	51,599	52,238
All without Medical Schools	50	22,026	23,000	24,055	24,120	24,267	25,303

[a]Source: National Center for Education Statistics.

Table 5A. Trends in Index Numbers for the Means of Educational-and-General Revenues Shown in Table 5 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Institutions	100	92.1	95.7	97.7	100.0	100.0	102.3
All Private Institutions	46	95.1	95.7	96.3	100.0	96.4	96.9
With Medical Schools	26	92.9	94.1	94.9	100.0	97.0	97.5
Without Medical Schools	20	101.5	100.8	100.5	100.0	94.7	95.1
All Public Institutions	54	89.5	95.7	99.0	100.0	103.2	107.1
With Medical Schools	24	92.0	97.8	98.8	100.0	102.6	104.9
Without Medical Schools	30	85.3	92.2	99.3	100.0	104.1	110.6
All with Medical Schools	50	92.5	95.9	96.8	100.0	99.7	101.1
All without Medical Schools	50	91.3	95.4	99.7	100.0	100.6	104.9

The E&G means for all of the 100 institutions in the sample which supplied data for all six years of the series are presented in the first line of Table 5. These figures show a slow, progressive increase in average E&G revenues from $34.9 million in FY 1969 to $38.8 million in FY 1974 (an increase of 11.1 per cent in constant dollars).

The nature of this trend is perceived more readily through inspection of the index numbers shown in Table 5A, where the means for other years are expressed as percentages of the mean for FY 1972. For all institutions combined, the index-number trend increases from 92.1 in FY 1969 to 102.3 in FY 1974--a rate of growth in revenues that will be shown later to have been somewhat lower than the overall increase in enrollment.

Private vs. Public Universities

It is immediately apparent from the data in Tables 5 and 5A that the E&G revenue trends for private and public institutions are quite different. The latter show a positive growth trend throughout the six-year period, with appreciable acceleration from FY 1972 to 1974. The private institutions, on the other hand, show a slower rate of revenue growth through FY 1972, and then a significant drop from the index value of 100.0 for the latter year to 96.4 and 96.9 for FY 1973 and 1974, respectively.

Presence or Absence of Medical Schools

When private and public institutions are combined on the basis of medical-school status, all institutions without medical schools show a somewhat more rapid rate of growth than those with them. However, when this type of breakdown is made within the private and the public sectors separately, different

patterns emerge. Private institutions with medical schools increased some 5 per cent in E&G revenues while those without them decreased 6.3 per cent from FY 1969 to 1974.

Both types of public institutions had progressive E&G revenue increases throughout that period, but those without medical schools had a much greater overall growth rate (30 per cent vs. 14 per cent for the group with medical schools).

Trend Differences among Carnegie-Commission Categories of Institutions

Since the Carnegie Commission's classification was established mainly in terms of doctorates and research funding, comparisons were made among these categories in terms of E&G revenue trends. The results are shown in Tables 6 and 6A on the following page.

The most important finding is that the constant-dollar decline in revenues noted in Table 5 for the private institutions after FY 1972 is attributable entirely to Research Universities I (the top-ranking category). Private Research Universities II and "Other Categories" showed positive growth during this period, with the latter group having the higher rate of increase (6.5% vs. 2.5%). From FY 1969 to 1974, the overall percentage changes were: Research Universities I, -2.5%; Research Universities II, 4.1%; Other Categories, 21.1%.

Among the public institutions, "Other Categories" likewise showed the highest rate of overall E&G revenue growth (29.1 per cent). For the two groups of research universities, the increases from FY 1969 to 1974 were: Research Universities I, 17.9%; Research Universities II, 15.6%.

Table 6. Trends in Mean Educational-and-General Revenues by Carnegie Commission Categories of Institutions--Constant Dollars in Thousands (Halstead HEPI as Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Private Institutions	46	$36,907	$37,158	$37,388	$38,814	$37,410	$37,627
Research Universities I	19	62,858	63,125	63,008	65,445	61,248	61,259
Research Universities II	12	21,077	21,073	21,064	21,418	21,934	21,948
Other Categories	15	16,698	17,135	17,994	18,998	19,597	20,236
All Public Institutions	54	33,277	35,591	36,827	37,199	38,378	39,829
Research Universities I	12	67,274	71,846	75,161	74,736	77,107	79,273
Research Universities II	18	32,120	34,153	34,782	35,439	36,030	37,118
Other Categories	24	17,148	18,542	19,194	19,750	20,775	22,139

[a]Source: National Center for Education Statistics.

Table 6A. Trends in Index Numbers for the Means of Educational-and-General Revenues Shown in Table 6 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Private Institutions	46	95.1	95.7	96.3	100.0	96.4	96.9
Research Universities I	19	96.0	96.5	96.3	100.0	93.6	93.6
Research Universities II	12	98.4	98.4	98.3	100.0	102.4	102.5
Other Categories	15	87.9	90.2	94.7	100.0	103.2	106.5
All Public Institutions	54	89.5	95.7	99.0	100.0	103.2	107.1
Research Universities I	12	90.0	96.1	100.6	100.0	103.2	106.1
Research Universities II	18	90.6	96.4	98.1	100.0	101.7	104.7
Other Categories	24	86.8	93.9	97.2	100.0	105.2	112.1

Comparative Data from Another ACE Study

Since the final year of the present study's data base was FY 1974, the results couldn't reflect the effects of the sharp cost escalation that has occurred since that time. It seemed desirable, therefore, to cite results from a recent study that extended through FY 1975, using more refined measures of cost inflation. Excerpts from the results of that study are summarized in Tables 7 and 7A on the following page, and a footnote to these tables gives the reference to the study.

The data in Tables 7 and 7A--derived from an ACE special survey--are based on E&G expenditures per full-time-equivalent (FTE) student for the top three Carnegie Commission categories of universities, covering the three fiscal years 1973, 1974, and 1975. The median values in constant dollars are presented in Table 7, and inspection of these figures shows both the expenditure levels and trends over the three-year period. But the magnitude and direction of the trends are measured more precisely by the percentage-change values shown in Table 7A. The latter were derived by computing such percentages for individual institutions, and then computing the median of these percentages for each category of institutions.

In general, all three groups of private universities had percentage decreases in constant dollars per FTE student for both FY 1974 and FY 1975 (the negative "growth" increasing for the latter year). Although not strictly comparable with the trend data shown in Table 5A for the present study, the two sets of results are consistent for their one common year (FY 1974).

Table 7. Median Educational-and-General Expenditures per Full-Time-Equivalent Student by Carnegie Commission Categories (Constant Dollars)[a]

Type of Institution	Number	Fiscal Year 1973	1974	1975
Private Institutions	36			
Research Universities I	12	$6,510	$6,393	$6,326
Research Universities II	11	3,312	3,357	3,075
Doctoral Universities I	13	2,570	2,354	2,248
Public Institutions	60			
Research Universities I	21	2,956	2,841	2,823
Research Universities II	16	2,078	2,262	2,153
Doctoral Universities I	23	1,818	1,871	1,735

Table 7A. Median Percentage Change in Educational-and-General Expenditures per FTE Student by Carnegie Commission Categories (in Current and in Constant Dollars)[a]

Type of Institution	Number	Current Dollars FY 1973 to 1974	FY 1974 to 1975	Constant Dollars FY 1973 to 1974	FY 1974 to 1975
Private Institutions	36				
Research Universities I	12	4.7%	5.8%	-2.0%	-3.8%
Research Universities II	11	1.7	1.5	-4.8	-7.7
Doctoral Universities I	13	5.1	4.2	-1.7	-5.3
Public Institutions	60				
Research Universities I	21	5.9	5.9	-0.9	-3.7
Research Universities II	16	7.8	5.9	0.9	-3.5
Doctoral Universities I	23	10.3	8.6	3.2	-1.3

[a]The data in Tables 7 and 7A were published in a monograph by Lyle H. Lanier and Charles J. Andersen entitled A Study of the Financial Condition of Colleges and Universities: 1972-75 (ACE Special Report, October, 1975).

In the case of the public institutions, the trend data in Table 5A all show greater positive growth for FY 1974 than those in Table 7A. But the differences might be due largely to the fact that in the earlier study median expenditure per FTE student in constant dollars was the average used, whereas in the present study the means of actual constant-dollars revenues were used (hence not taking into account enrollment changes).

It seems reasonable to conclude--in the light of inflation-recession trends in the national economy--that if the present study had been able to include E&G trend data for FY 1975, a progressively worsening financial picture for the research universities would have emerged. This conclusion is supported by a recent article by William G. Bowen.[6]

[6]Bowen, William G. The Effects of Inflation/Recession on Higher Education. Educational Record, Summer 1975, Volume 56, No. 3.

IV. TRENDS IN REVENUES FOR SPONSORED RESEARCH

Since the basic-research capability of the nation resides largely in the research universities, it seems obviously important to know the nature and extent of changes that might have been occurring in the financial support for university-based research in recent years. This problem has been studied through the examination of three sets of trends:

1. Trends in the proportions of R&D funds in the total educational (E&G) budgets of universities in the sample.
2. Trends in the total support for university R&D in all fields, by types of institutions, in constant dollars.
3. Trends in federally sponsored R&D in all fields by types of institutions, in constant dollars.

R&D Proportions of Total E&G Revenues

Research and development at universities are supported by funds from various sources but by far the greater part comes from federal agencies. The institutions report annually to the National Center for Education Statistics the total amounts provided for sponsored research, with breakdowns by major sources. Hence, percentage relationships between these R&D revenue components and total E&G revenues may be computed.

The present analysis has been limited to calculations of two sets of percentages for various groupings of the sample of institutions: (a) total R&D revenues as a percentage of total E&G revenues; (b) federal R&D revenues as a percentage of total E&G revenues. The difference between these two types of percentage values obviously gives directly the proportion of non-federal funding of R&D activities in the E&G budget. (To conserve space, these residual

percentages have been omitted from the summary of the results in Table 8 on the following page.) The trends in the two sets of percentages are shown for the six fiscal years (1969-1974) for which NCES data were available--first for all institutions combined and then for the various sub-groups within the total sample shown in earlier tables:

Trends for all institutions. The first line of Table 8 shows that total R&D revenues decline slowly from 21 per cent of E&G funds in FY 1969 to 19 per cent in FY 1974 (the decline in percentage points represents a drop of 9.5 per cent).

The corresponding decline for federal R&D funding, shown in the second line of the table, is somewhat greater: a drop from 18 per cent of total E&G revenues in FY 1969 to 15 per cent in FY 1974 (representing a percentage decline of 16.7 per cent).

Another method of comparing the two R&D variables is to calculate the percentage relationship between the federal R&D and the total R&D components. For example, in FY 1969, federal R&D funds accounted for 85.7 per cent of total R&D support; but by FY 1974 this proportion had declined to 78.9 per cent.

All private institutions. The second section of Table 8 shows similar percentage data for all private institutions; and within the private sector, corresponding percentages are shown for institutions with and those without medical schools. These data show generally that the private institutions have higher proportions of R&D funds in their total educational budgets than all institutions combined. The trend patterns, however, are generally similar to those just described for all institutions combined: moderate declines both in total and in federally sponsored R&D funds as proportions of total E&G revenues. For example, total R&D funds for FY 1969 provided 28 per cent of the E&G budget, but the proportion dropped to 25 per cent by FY 1974 (a 10.7 per cent decline in percentage points.) The decline is somewhat greater for federal R&D revenues: from 24 per cent of E&G funds in FY 1969 to 21 per cent in 1974 (a 12.5 per cent drop).

In terms of the relationship of federal R&D funds to total R&D revenues, for private institutions the percentage relation for FY 1969 is 85.7 per cent, and this value declines only slightly to 84 per cent fy FY 1974.

Table 8. Trends in Total and in Federally Sponsored R&D Revenues as Percentages of Educational-and-General Revenues (Based on Constant Dollars)[a,b]

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Institutions							
Total R&D/Total E&G Rev.	100	21%	20%	19%	20%	20%	19%
Federal R&D/Total E&G Rev.	100	18	17	16	16	16	15
All Private Institutions							
Total R&D/Total E&G Rev.	46	28	27	26	27	27	25
Federal R&D/Total E&G Rev.	46	24	23	21	22	21	21
With Medical Schools							
Total R&D/Total E&G	26	29	29	28	28	29	27
Federal R&D/Total E&G	26	25	24	22	23	23	22
Without Medical Schools							
Total R&D/Total E&G	20	26	25	24	25	24	23
Federal R&D/Total E&G	20	23	22	20	21	20	19
All Public Institutions							
Total R&D/Total E&G Rev.	54	16	14	13	14	14	13
Federal R&D/Total E&G Rev.	54	13	12	11	11	11	10
With Medical Schools							
Total R&D/Total E&G	24	17	17	16	16	17	16
Federal R&D/Total E&G	24	14	14	13	13	13	13
Without Medical Schools							
Total R&D/Total E&G	30	14	12	11	12	12	11
Federal R&D/Total E&G	30	12	10	9	9	10	9
All with Medical Schools							
Total R&D/Total E&G Rev.	50	24	23	22	22	23	22
Federal R&D/Total E&G Rev.	50	20	19	18	18	18	17
All without Medical Schools							
Total R&D/Total E&G Rev.	50	19	17	16	17	17	16
Federal R&D/Total E&G Rev.	50	16	15	13	14	14	13

[a]Source: National Center for Education Statistics.

[b]See Table 4 for the price indices used as deflators: (a) for E&G revenues, Halstead's Higher Education Price Index; (b) for R&D revenues, the R&D price index recently developed by Westat, Inc. for NIH.

All public institutions. Public institutions generally have lower proportions of R&D funds in their total E&G budgets than private institutions. This is due partly to the fact that public universities engage in a much wider variety of educational functions than do private institutions (e.g., substantially larger extension and public service programs, as well as many educational programs not conducted by private institutions such as those in agriculture and other vocationally oriented curricula).

Public institutions show declines similar to those of private institutions, both in total R&D and in federal R&D funds as proportions of their total educational budgets, but the overall percentage decreases tend to be somewhat higher than those found for all private institutions. For example, total R&D funds declined from 16 to 13 per cent of total E&G funds over the six year period (a drop of 18.8 per cent); while the decline for federal R&D funds over the same period is from 13 to 10 per cent (a drop of 23 per cent).

Presence or absence of medical schools. The last two sections of Table 8 show R&D/E&G percentages for institutions with and those without medical schools (combining data for private and public universities). The differences between the two groups of institutions are not great, but there is a slight tendency for universities with medical schools to show somewhat smaller percentage declines over the six year period, for both total and federal R&D funds, than is the case for institutions without medical schools.

Trends in All Sponsored R&D Revenues

Although federally sponsored R&D funds constitute most of the support for research in universities, it was decided to make separate trend analyses for the total amount and for the federal component. The procedure is the same as that followed in chapter III for total E&G revenues. Mean values per institution in constant dollars are shown in a table for the several years in the data series by several groupings of institutions. In an accompanying table on the same page, trends in index numbers for the constant-dollar means are presented for purposes of ready comparisons of trends. Following this format, the trend data for sponsored R&D revenues are shown on the following page in Tables 9 and 9A, by type of institution. The results for the three main groupings may be briefly summarized as follows:

All institutions combined. Inspection of the index-number values in Table 9A shows a somewhat more irregular trend for R&D funds than was found earlier for total E&G revenues. There is a slow decline from FY 1969 through FY 1971; then an increase for FY 1972 which was maintained virtually constant through FY 1973--followed by a substantial drop in FY 1974. The decline over the six-year period was approximately 6 per cent.

Private vs. public institutions. The trend indices in Table 9A show that the private institutions follow the pattern just described for all institutions through FY 1972, followed by a rather marked decline from the index value of 100 for that year to 94.3 for FY 1973 and 91.2 for FY 1974.

Public institutions, on the other hand, maintained an essentially constant level of R&D expenditure from FY 1969 through FY 1972, but then increased sharply from the index number of 100 to 109.4 for FY 1973--followed by a drop to 103.8 in FY 1974. Thus, although differing somewhat both in pattern and magnitude, the changes after FY 1972 are essentially similar for R&D funding to what was found for total E&G funding: namely, the private institutions experienced a relative decrease while public institutions had an increase in R&D funding after FY 1972.

Over the entire period (FY 1969-1974) private universities had a decline of 12 per cent in R&D revenues, while public universities showed a slight increase of 4.8 per cent.

Table 9. Trends in Mean Sponsored R&D Revenues by Type of Institution--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Institutions	100	$ 8,920	$ 8,872	$ 8,455	$ 8,736	$ 8,728	$ 8,379
All Private Institutions	46	12,411	12,129	11,449	11,948	11,264	10,901
With Medical Schools	26	15,313	15,273	14,485	15,108	15,100	14,589
Without Medical Schools	20	8,639	8,041	7,502	7,839	6,279	6,107
All Public Institutions	54	5,946	6,098	5,905	6,001	6,567	6,230
With Medical Schools	24	9,419	9,836	9,532	9,595	10,564	9,908
Without Medical Schools	30	3,168	3,107	3,004	3,125	3,370	3,288
All with Medical Schools	50	12,484	12,663	12,107	12,462	12,922	12,342
All without Medical Schools	50	5,356	5,081	4,803	5,011	4,534	4,416

[a]Source: National Center for Education Statistics.

Table 9A. Trends in Index Numbers for the Means of Sponsored R&D Revenues Shown in Table 9 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Institutions	100	102.1	101.6	96.8	100.0	99.9	95.9
All Private Institutions	46	103.9	101.5	95.8	100.0	94.3	91.2
With Medical Schools	26	101.4	101.1	95.9	100.0	99.9	96.6
Without Medical Schools	20	110.2	102.6	95.7	100.0	80.1	77.9
All Public Institutions	54	99.1	101.6	98.4	100.0	109.4	103.8
With Medical Schools	24	98.2	102.5	99.3	100.0	110.1	103.3
Without Medical Schools	30	101.4	99.4	96.1	100.0	107.8	105.2
All with Medical Schools	50	100.2	101.6	97.2	100.0	103.7	99.0
All without Medical Schools	50	106.9	101.4	95.8	100.0	90.5	88.1

Presence vs. absence of medical schools. Combining private and public institutions, universities with medical schools seemed to fare somewhat better than those without them relative to level of R&D funding throughout the entire period from FY 1969 to 1974. But such a combination produces misleading results, as the figures in Table 9A show. Private institutions with medical schools do show negative growth after FY 1972, but the extent of it is far less than for universities without medical schools (the drop in index numbers for the latter is from 100 in FY 1972 to 77.9 in 1974). In the case of public institutions, on the other hand, those with and those without medical schools both show substantial increases in R&D funds after FY 1972--with growth over the two-year period to FY 1974 being roughly equivalent for the two groups.

Trends in R&D revenues by Carnegie Commission categories. It will be recalled that total E&G revenues showed an average decline for private institutions after FY 1972, but that all of it occurred in the top category, Research Universities I. Similar comparisons were made for R&D revenues; but the figures in Tables 10 and 10A on the following page do not agree with the E&G results. In general, all Carnegie Commission categories of private institutions had declines in R&D revenues after FY 1972, the index numbers for FY 1974 being as follows: Research Universities I, 90.9; Research Universities II, 94.1; Other Categories, 90.3.

In the case of public universities, there generally was substantial positive growth in sponsored R&D funds after FY 1972, with only Research Universities II showing a rather sharp decline from an index level of 107 for FY 1973 to 96.6 for FY 1974.

The comparative percentage changes in R&D revenues from FY 1969 to 1974 for the Carnegie Commission categories may be summarized as follows:

	Private	Public
Research Universities I	-12.3%	6.7%
Research Universities II	-17.0	-4.0
Other Categories	- 3.7	12.6

Table 10. Trends in Mean Sponsored R&D Revenues by Carnegie Commission Categories of Institutions--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Private Institutions	46	$12,411	$12,129	$11,449	$11,948	$11,264	$10,901
Research Universities I	19	23,864	23,577	21,993	23,023	21,554	20,937
Research Universities II	12	5,975	5,563	5,349	5,276	5,170	4,962
Other Categories	15	3,052	2,879	2,973	3,257	3,106	2,940
All Public Institutions	54	5,946	6,098	5,905	6,001	6,567	6,230
Research Universities I	12	14,582	14,780	14,370	14,807	16,320	15,565
Research Universities II	18	5,302	5,495	5,305	5,296	5,666	5,166
Other Categories	24	2,112	2,209	2,123	2,127	2,367	2,362

[a]Source: National Center for Education Statistics.

Table 10A. Trends in Index Numbers for the Means of Sponsored R&D Revenues Shown in Table 10 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Private Institutions	46	103.9	101.5	95.8	100.0	94.3	91.2
Research Universities I	19	103.7	102.4	95.5	100.0	93.6	90.9
Research Universities II	12	113.3	105.4	101.4	100.0	98.0	94.1
Other Categories	15	93.7	88.4	91.3	100.0	95.4	90.3
All Public Institutions	54	99.1	101.6	98.4	100.0	109.4	103.8
Research Universities I	12	98.5	99.8	97.0	100.0	110.2	105.1
Research Universities II	18	100.1	103.8	100.2	100.0	107.0	97.6
Other Categories	24	99.3	103.9	99.8	100.0	111.3	111.0

Federally Sponsored R&D Revenues

Trends in federally sponsored R&D revenues, by type of institution, are shown on the following page in Table 11 (means in constant dollars) and Table 11A (index numbers with the mean for FY 1972 as the base). The results will be discussed mainly in terms of index-number trends shown in Table 11A, since such values are most easily compared within and among the several categories of institutions.

There are significant differences between the trends for federally sponsored R&D revenues and those for total R&D revenues shown earlier in Tables 9-9A. For example, federal R&D funds stood at a higher index level in FY 1969 for all institutions combined than was the case for all R&D revenues (106.2 vs. 102.1). But federal R&D funding level declined more sharply overall from FY 1969 through 1974 than happened for all R&D revenues, (-9.7% vs. -6.1%), although the terminal index differences were not great (94.5 vs. 95.9).

Private vs. public universities. The private institutions showed declines in federal R&D funding levels after FY 1972 somewhat greater than those found for all sponsored R&D revenues, but the patterns and the end results in FY 1974 were essentially similar (90.7 vs. 91.2 in index values).

Public institutions showed growth in federal R&D funding after FY 1972, but the FY 1974 levels were lower than for all sponsored R&D revenues (101.2 vs. 103.8). Both types of institutions had appreciable declines in federal R&D funding from FY 1973 to 1974, and the public sector showed the greater rate of decline. But for FY 1974, the index number for the public group was 101.2 while that for the private group was 90.7--relative to the base year (FY 1972 = 100).

The overall percentage changes in federal R&D funds from FY 1969 to 1974 were: private universities, -17.1%; public universities, 0.5%.

Presence or absence of medical schools. There appear to be no significant differences between the trend patterns for federally sponsored R&D revenues and those for all sponsored revenues, in terms of presence or absence of medical schools--when public and private data were combined in each case: institutions with medical schools showed less decline in both total and federal R&D funds than those without medical schools.

Table 11. Trends in Mean Federally Sponsored R&D Revenues by Type of Institution--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Institutions	100	$ 7,549	$ 7,405	$ 6,853	$ 7,110	$ 7,019	$ 6,721
All Private Institutions	46	10,710	10,285	9,406	9,795	9,177	8,882
With Medical Schools	26	12,999	12,632	11,590	12,042	12,197	11,835
Without Medical Schools	20	7,734	7,235	6,566	6,875	5,251	5,043
All Public Institutions	54	4,856	4,951	4,679	4,822	5,180	4,880
With Medical Schools	24	7,655	7,947	7,566	7,776	8,328	7,900
Without Medical Schools	30	2,617	2,554	2,369	2,459	2,661	2,464
All with Medical Schools	50	10,434	10,383	9,658	9,994	10,340	9,946
All without Medical Schools	50	4,664	4,426	4,048	4,225	3,697	3,495

[a]Source: National Center for Education Statistics.

Table 11A. Trends in Index Numbers for the Means of Federally Sponsored R&D Revenues Shown in Table 11 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Institutions	100	106.2	104.2	96.4	100.0	98.7	94.5
All Private Institutions	46	109.3	105.0	96.0	100.0	93.7	90.7
With Medical Schools	26	107.9	104.9	96.2	100.0	101.3	98.3
Without Medical Schools	20	112.5	105.2	95.5	100.0	76.4	73.4
All Public Institutions	54	100.7	102.7	97.0	100.0	107.4	101.2
With Medical Schools	24	98.4	102.2	97.3	100.0	107.1	101.6
Without Medical Schools	30	106.4	103.9	96.3	100.0	108.2	100.2
All with Medical Schools	50	104.4	103.9	96.6	100.0	103.5	99.5
All without Medical Schools	50	110.4	104.8	95.8	100.0	87.5	82.7

Federally sponsored R&D revenues by Carnegie Commission categories.

Federal R&D trend data for institutions classified by the Carnegie Commission categories are shown in Tables 12 and 12A on the following page. The comparative percentage changes over the six-year period (1969-1974) for public and private institutions were as follows:

	Private	Public
Research Universities I	-17.5%	1.0%
Research Universities II	-20.2	-6.0
Other Categories	- 7.2	5.8

The patterns of changes shown in these figures for federal R&D funds are quite similar to those described earlier for all R&D revenues. But the magnitudes of the percentage decreases are greater for federal than for total R&D funding in private universities; and in the case of the public universities showing increases, they are less for federal than for total R&D revenues.

In general, the private universities have suffered serious losses of research support in recent years--nonfederal as well as federal--with Research Universities II being hardest hit but with Research Universities I also showing a sharp decline. And it was the latter, it should be recalled, that showed a substantial drop in total E&G revenues after FY 1972.

Table 12. Trends in Mean Federally Sponsored R&D Revenues by Carnegie Commission Categories--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Private Institutions	46	$10,710	$10,285	$ 9,406	$ 9,795	$ 9,177	$ 8,882
Research Universities I	19	20,800	19,985	18,198	18,978	17,758	17,157
Research Universities II	12	5,030	4,842	4,352	4,374	4,146	4,014
Other Categories	15	2,473	2,352	2,312	2,501	2,333	2,294
All Public Institutions	54	4,856	4,951	4,679	4,822	5,180	4,880
Research Universities I	12	12,063	11,801	11,332	11,929	13,106	12,300
Research Universities II	18	4,221	4,512	4,257	4,269	4,368	4,047
Other Categories	24	1,728	1,856	1,668	1,683	1,826	1,794

[a]Source: National Center for Education Statistics.

Table 12A. Trends in Index Numbers for the Means of Federally Sponsored R&D Revenues Shown in Table 12 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1969	1970	1971	1972	1973	1974
All Private Institutions	46	109.3	105.0	96.0	100.0	93.7	90.7
Research Universities I	19	109.6	105.3	95.9	100.0	93.6	90.4
Research Universities II	12	115.0	110.7	99.5	100.0	94.8	91.8
Other Categories	15	98.9	94.1	92.4	100.0	93.3	91.7
All Public Institutions	54	100.7	102.7	97.0	100.0	107.4	101.2
Research Universities I	12	101.1	98.9	95.0	100.0	109.9	103.1
Research Universities II	18	98.9	105.7	99.7	100.0	102.3	94.8
Other Categories	24	102.7	110.3	99.1	100.0	108.5	106.6

V. TRENDS IN EXPENDITURES FOR BIOMEDICAL-BEHAVIORAL RESEARCH

All of the financial data reported in the preceding sections were revenues from the NCES-HEGIS financial survey, which provided only aggregate data for the entire institution and all academic fields. In order to study R&D expenditures in the biomedical-behavioral fields, it was necessary to secure data from the National Science Foundation's "Survey of Scientific Activities of Institutions of Higher Education," which collects data on current expenditures for separately budgeted R&D in the sciences and engineering.[7] This survey has been conducted biennially from FY 1964 through 1972 and annually thereafter. However, no records for FY 1966 were available, with the result that the present report covers only the fiscal years 1964, 1968, 1970, 1972, 1973, and 1974.

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[7]Prior to FY 1973, this NSF expenditure survey asked institutions to exclude "development" funds from their reports and was described as a survey of "research" expenditures. But beginning with FY 1973, composite reports of all "research and development" funds were requested. In addition, institutions were asked to make overall percentage estimates of expenditures for basic research, applied research, and development. For FY 1974, NSF reported that about 4 per cent of all expenditures for academic R&D was estimated to be for "development."

The 1973 change in the scope of the NSF survey raises a serious question as to the comparability of prior data with those collected after the change. Without any evidence as to whether or not the institutions were actually excluding "development" expenditures from their earlier reports, it has been decided to use data for 1973 and 1974 as reported rather than to reduce them by, say, the estimated average percentage of development funds. It is probable, in any event, that most of the latter type of funding occurred in the fields of engineering and physical sciences. Although no data are available to support the assumption, it seems unlikely that universities would have received an appreciable proportion of their federal funding in the biomedical-behavioral sciences as "development" grants. Furthermore, "development" activities would probably have been included in grants made primarily for research purposes and hence reported for "research" in the survey.

The term "biomedical-behavioral" refers here to a composite of the following four groups of disciplines included in the NSF "Survey of Scientific Activities of Institutions of Higher Education": (a) biological sciences (including agriculture), (b) clinical medical sciences, (c) life sciences not elsewhere classified, and (d) psychology (all fields).

A total of 143 institutions of the 148 in the original sample supplied data for the NSF expenditure survey, for all six years indicated above. By contrast, it will be recalled that for the NCES financial surveys the number of institutions providing data every year was only 100.

Since the four components of the "biomedical-behavioral" complex were found to differ considerably among themselves in magnitude of mean expenditures and in trends, it seemed desirable to present results both for the composite category and for the individual discipline groups. The analysis and presentation in the case of the composite category followed the general plan used in the two preceding chapters--for both total and federally funded R&D expenditures: (a) pairs of tables showing means and index-number trends for all institutions combined, for all private institutions (with and without medical schools), for all public institutions (with and without medical schools), and for all institutions with and for those without medical schools; (b) parallel pairs of tables showing means and index-number trends for private and public institutions classified by categories of the Carnegie Commission on Higher Education.

In the case of the four discipline groups, it was decided to present data in these two analytical formats only for federally funded R&D expenditures.

The reasons were partly to avoid undue proliferation of tables and partly because federal funds constituted both the greater part of R&D funding in these fields and the main focus of interest in this study.

In order to simplify comparisons of data within each of the two modes or formats for classifying institutions, all of the tables based on Carnegie Commission categories have been placed in Appendix B. The other set of tables--i.e. those with breakdowns by type of control and medical-school status--will appear in the text (each one following the page on which it is first cited).

R&D Expenditures for All Biomedical-Behavioral Sciences

All sources of R&D funds. Mean expenditures for all biomedical-behavioral expenditures by type of institution, in constant dollars, are presented in Tables 13 and 13A on the following page. It is evident from inspection of the index-number trend shown in the first line of Table 13A that total expenditures for biomedical-behavioral R&D have followed quite a different pattern from that shown for all sponsored R&D revenues in Table 9A. Biomedical-behavioral funding increased substantially after FY 1972 (the base year), whereas all sponsored R&D revenues declined.

Private vs. public institutions. Although the positive growth rate is somewhat lower for private than for public institutions, the trend is definitely positive from FY 1964 through FY 1973--with a slight "recession" in FY 1974.

The pattern for public institutions differs slightly from that for the private sector, in that a very considerable increase was recorded for FY 1970 which didn't occur for private universities. Furthermore, the growth rate after FY 1972 was considerably higher for the public than for the private universities. But all were substantially positive and both groups showed moderate declines in FY 1974 from the peak year, FY 1973.

Table 13. Trends in Mean Expenditures for All Biomedical-Behavioral Research by Type of Institution--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	$ 3,981	$ 5,040	$ 5,284	$ 5,262	$ 5,822	$ 5,737
All Private Institutions	54	4,265	5,694	5,693	6,033	6,545	6,390
With Medical Schools	32	6,640	8,734	8,798	9,299	9,996	9,779
Without Medical Schools	22	811	1,273	1,178	1,282	1,525	1,460
All Public Institutions	89	3,809	4,643	5,036	4,794	5,383	5,340
With Medical Schools	34	5,123	6,373	7,767	7,618	8,552	8,200
Without Medical Schools	55	2,997	3,573	3,347	3,049	3,424	3,572
All with Medical Schools	66	5,858	7,517	8,267	8,433	9,252	8,966
All without Medical Schools	77	2,372	2,916	2,727	2,544	2,881	2,969

[a]Source: National Science Foundation.

Table 13A. Trends in Index Numbers for the Means of All Expenditures for Biomedical-Behavioral Research Shown in Table 13 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	75.7	95.8	100.4	100.0	110.6	109.0
All Private Institutions	54	70.7	94.4	94.4	100.0	108.5	105.9
With Medical Schools	32	71.4	93.9	94.6	100.0	107.5	105.2
Without Medical Schools	22	63.2	99.3	91.9	100.0	119.0	113.9
All Public Institutions	89	79.5	96.8	105.0	100.0	112.3	111.4
With Medical Schools	34	67.2	83.7	102.0	100.0	112.3	107.6
Without Medical Schools	55	98.3	117.2	109.8	100.0	112.3	117.2
All with Medical Schools	66	69.5	89.1	98.0	100.0	109.7	106.3
All without Medical Schools	77	93.3	114.6	107.2	100.0	113.3	116.7

Presence vs. absence of medical schools. The index-number trends presented in Table 13A show that institutions without medical schools--both public and private--had markedly higher rates of expenditure increase for biomedical-behavioral R&D than those with medical schools. For example, private institutions with medical schools had an index of 105.2 for FY 1974 in comparisons with 113.9 for institutions without medical schools. The corresponding figures for public institutions were 107.6 and 117.2.

Combining both private and public institutions, those with medical schools had an FY 1974 index of 106.3, while for those without them the index was 116.7. It should be noted, however, that for both the public and private sectors, institutions with medical schools had far higher expenditure levels in real dollars than those without medical schools--as shown in Table 13. For example, in FY 1974 private institutions with medical schools had mean expenditures of approximately $9.8 million, while for those without medical schools the corresponding figure was $1.5 million. The disparity was less for public institutions: mean expenditures of $8.2 million for institutions with medical schools in FY 1974, in contrast to $3.6 million for universities without medical schools.

Differences among Carnegie Commission categories of institutions. The trend data for all sources of R&D funds by Carnegie Commission categories are shown in Appendix TABLES B-1 and B-1A. It is important to recognize that Research Universities I, both public and private, have by far the largest share of the R&D funds--as shown by the means in TABLE B-1.

Even so, private Research Universities I had considerably higher percentage gains between FY 1964 and 1974 (62 per cent) than either of the other two categories--which in descending order had gains of 11 per cent and -11 per cent during that period.

For the public universities, the 11-year increases were: Research Universities I, 42 per cent; Research Universities II, 32 per cent; Other Categories, 50 per cent.

Federally funded R&D expenditures for biomedical-behavioral sciences. Data comparable to those in Tables 13-13A for all biomedical-behavioral R&D expenditures are presented in Tables 14 and 14A on the following page, for federally funded R&D expenditures in these fields.

The trend in federal R&D funding for all institutions combined differs somewhat in pattern from that for all biomedical-behavioral R&D funds; but the

Table 14. Trends in Mean Federally Funded Expenditures for Biomedical-Behavioral Research by Type of Institution--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	$ 2,669	$ 3,588	$ 3,666	$ 3,472	$ 3,903	$ 3,737
All Private Institutions	54	3,465	4,711	4,520	4,522	5,045	4,878
With Medical Schools	32	5,361	7,267	7,040	7,003	7,841	7,591
Without Medical Schools	22	708	993	856	913	978	931
All Public Institutions	89	2,185	2,907	3,148	2,835	3,210	3,044
With Medical Schools	34	3,305	4,547	5,547	5,214	5,863	5,458
Without Medical Schools	55	1,493	1,894	1,666	1,365	1,570	1,552
All with Medical Schools	66	4,302	5,866	6,271	6,081	6,822	6,492
All without Medical Schools	77	1,268	1,636	1,434	1,236	1,401	1,374

[a]Source: National Science Foundation.

Table 14A. Trends in Index Numbers for the Means of Federally Funded Expenditures for Biomedical-Behavioral Research Shown in Table 14 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	76.9	103.3	105.6	100.0	112.4	107.6
All Private Institutions	54	76.6	104.2	100.0	100.0	111.6	107.9
With Medical Schools	32	76.6	103.8	100.5	100.0	112.0	108.4
Without Medical Schools	22	77.5	108.7	93.7	100.0	107.0	101.9
All Public Institutions	89	77.1	102.5	111.0	100.0	113.2	107.4
With Medical Schools	34	63.4	87.2	106.4	100.0	112.5	104.7
Without Medical Schools	55	109.4	138.7	122.0	100.0	115.1	113.7
All with Medical Schools	66	70.7	96.5	103.1	100.0	112.2	106.8
All without Medical Schools	77	102.6	132.4	116.0	100.0	113.4	111.2

overall percentage gains between FY 1964 and 1974 were almost identical: 44 per cent for all sources of R&D funds and 40 per cent for the federal component. Both showed marked gains in FY 1973 over FY 1972, and both declined in FY 1974 (but federal R&D funds more sharply).

Private vs. public universities. In overall percentage terms, private institutions showed an increase of 41 per cent in federal R&D funds over the 11-year period, as compared to 39 per cent for the public sector. The public institutions had a slightly higher increase after FY 1972: 13 vs. 12 per cent for FY 1973, with a sharper drop in funding for FY 1974 to about the same level as the private sector (relative to the FY 1972 index base).

Presence vs. absence of medical schools. Although the biomedical-behavioral funding trends are somewhat mixed, and different for private than for public universities, the R&D growth rates for institutions without medical schools tended overall to be somewhat higher than those for universities with medical schools. However, these composite trends mask rather clear-cut differences between private and public institutions: (a) for the private sector, institutions with medical schools show substantially higher growth rates after FY 1972 than those without medical schools; (b) for public universities, the general trend was in the opposite direction.

Again, it should be emphasized that in terms of actual expenditure levels in real dollars, institutions with medical schools, both public and private, stood far above those without medical schools (see Table 14).

Comparisons of Carnegie Commission categories of institutions. Institutional breakdowns of federal R&D funding by Carnegie Commission classes are shown in Appendix TABLES B-2 and B-2A. Comparisons of the means and index numbers in these tables should again be tempered by the fact that the funds for both private and public universities are heavily concentrated in the Research Universities I category.

Over the 11-year period, the following are the overall percentage changes in federal R&D funding: (a) Research Universities I (private, 51%; public, 46%); Research Universities II (private, 7%; public, 19%); Other Categories (private, -14%; public, 48%).

R&D Expenditures by Groups of Biomedical-Behavioral Disciplines

The following sections will present detailed data for the four disciplines comprising the "biomedical-behavioral" complex as described above. Only those

for biological sciences, medical sciences, and psychology will be discussed in the text. Detailed tables are included in the text and in Appendix B for "Life Sciences not Elsewhere Classified"; but due to its miscellaneous nature and the relatively small funding levels, no discussion of this category has been included.

Federally funded R&D expenditures for biological sciences. The means and index numbers for institutions classified by control and medical school status are shown in Tables 15 and 15A on the following page. The data for all institutions combined are similar in pattern to those shown in Tables 14 and 14A for total biomedical-behavioral R&D funding, except that the biological sciences received a relatively much higher increase in FY 1973. (The 11-year increase for the total sample in federal R&D funding for biological sciences was 49 per cent.)

Except for private universities without medical schools, all institutional subgroups participarted in the sharp funding increase in FY 1973--with public institutions gaining 26 per cent and the private sector 17 per cent. But the latter suffered a relatively small drop in FY 1974, whereas the public universities lost almost all of their gain. Institutions without medical schools fared better than those with them in holding their post-1972 increases.

The trends in biological R&D funding by Carnegie Commission categories are shown in Appendix TABLES B-3 and B-3A. There are striking differences between the private and public sectors in the post-1972 trends for the two classes of research universities. For Research Universities I, both private and public institutions had sharp FY 1973 increases (22 and 27 per cent,

Table 15. Trends in Mean Federally Funded Expenditures for Biological (Agriculture Included) Research by Type of Institution--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	$1,105	$1,439	$1,527	$1,524	$1,860	$1,643
All Private Institutions	54	1,107	1,599	1,540	1,704	1,996	1,966
With Medical Schools	32	1,476	2,198	2,116	2,362	2,865	2,797
Without Medical Schools	22	571	729	701	746	733	757
All Public Institutions	89	1,103	1,342	1,519	1,414	1,778	1,448
With Medical Schools	34	1,365	1,799	2,488	2,178	2,638	1,910
Without Medical Schools	55	941	1,059	920	942	1,246	1,162
All with Medical Schools	66	1,419	1,992	2,308	2,267	2,748	2,340
All without Medical Schools	77	835	965	857	886	1,100	1,046

[a]Source: National Science Foundation.

Table 15A. Trends in Index Numbers for the Means of Federally Funded Expenditures for Biological Research Shown in Table 15 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	72.5	94.4	100.2	100.0	122.1	107.9
All Private Institutions	54	65.0	93.9	90.4	100.0	117.2	115.4
With Medical Schools	32	62.5	93.0	89.6	100.0	121.3	118.4
Without Medical Schools	22	76.5	97.6	93.9	100.0	98.2	101.5
All Public Institutions	89	78.0	94.9	107.4	100.0	125.7	102.4
With Medical Schools	34	62.7	82.6	114.2	100.0	121.1	87.7
Without Medical Schools	55	99.9	112.4	97.6	100.0	132.3	123.3
All with Medical Schools	66	62.6	87.9	101.8	100.0	121.2	103.2
All without Medical Schools	77	94.2	108.9	96.7	100.0	124.1	118.1

respectively); but in FY 1974, the private universities lost very little of their gain (3 per cent) while public Research Universities I lost about 29 per cent.

In the case of Research Universities II, the public institutions gained some 14 per cent in federal R&D funds for biology in FY 1973, with a slight increase in the following year. But the private universities in this category had a sharp decline of about 13 per cent in FY 1973 and gained only 4 per cent from that level in FY 1974.

Federally funded R&D expenditures for medical sciences. The means and index numbers for this variable are shown in Tables 16 and 16A on the following page. Comparison of the means for all institutions combined with those in Table 15 for biological sciences shows that those for medical sciences are somewhat higher. The trends in means for the two areas from FY 1964 to 1974 are also different in pattern. The mean expenditure for medical sciences reached its peak in FY 1968; and, after fluctuating down and up, only managed to get back almost to the 1968 level in FY 1974. By contrast, the growth peak for biological sciences wasn't reached until FY 1973. Over the 11-year period, federal R&D funding for medical sciences increased 22 per cent vs. 49 per cent for biological sciences.

The most striking difference shown in Table 16A between public and private universities in federal R&D funds for medical sciences is the opposite trends from FY 1973 to 1974. Private institutions show a decline of 8 per cent while the public group increases 21 per cent.

Since virtually all of the federal R&D funds for medical sciences were granted to institutions with medical schools, trend comparisons of these

Table 16. Trends in Mean Federally Funded Expenditures for Medical Research by Type of Institution--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	$1,422	$1,749	$1,705	$1,581	$1,679	$1,742
All Private Institutions	54	2,194	2,751	2,641	2,505	2,648	2,443
With Medical Schools	32	3,651	4,569	4,441	4,209	4,431	4,095
Without Medical Schools	22	73	106	23	26	55	41
All Public Institutions	89	953	1,142	1,138	1,021	1,092	1,317
With Medical Schools	34	1,741	2,148	2,354	2,370	2,633	3,074
Without Medical Schools	55	466	520	386	187	139	231
All with Medical Schools	66	2,667	3,322	3,366	3,262	3,505	3,569
All without Medical Schools	77	354	401	282	141	115	176

[a]Source: National Science Foundation.

Table 16A. Trends in Index Numbers for the Means of Federally Funded Expenditures for Medical Research Shown in Table 16 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	89.9	110.6	107.8	100.0	106.2	110.2
All Private Institutions	54	87.6	109.8	105.4	100.0	105.7	97.5
With Medical Schools	32	86.8	108.6	105.5	100.0	105.3	97.3
Without Medical Schools	22	282.3	406.3	89.9	100.0	210.1	155.9
All Public Institutions	89	93.3	111.8	111.4	100.0	106.9	129.0
With Medical Schools	34	73.5	90.7	99.3	100.0	111.1	129.7
Without Medical Schools	55	249.0	277.7	206.3	100.0	74.0	123.3
All with Medical Schools	66	81.8	101.9	103.2	100.0	107.5	109.4
All without Medical Schools	77	250.7	284.4	200.1	100.0	81.2	125.0

universities with those without medical schools would be relatively meaningless.

The comparisons of federal R&D funding for medical sciences by Carnegie Commission categories are shown in Appendix TABLES B-4 and B-4A. These data show clearly that the decline in FY 1974 funding noted above for all private universities combined was concentrated in Research Universities I (which had most of the private R&D total for medical sciences). By contrast, public Research Universities I had increases after FY 1972 markedly above those for the two other public categories.

In percentage terms, the 11-year increase in federal R&D funds for private Research Universities I in medical sciences was 22 per cent, while the corresponding increase for public universities was 56 per cent.

Federally funded R&D expenditures for life sciences not elsewhere classified. Data for this category of disciplines are included in Tables 17 and 17A (on the following page) and in Appendix TABLES B-5 and B-5A. But, as already noted, the small amounts involved and the miscellaneous nature of the disciplinary group do not make discussion of the results seem profitable. Inspection of the index trends in Table 17A shows how erratically the mean values fluctuate from year to year and from group to group.

Table 17. Trends in Mean Federally Funded Expenditures for Research in Life Sciences Not Elsewhere Classified, by Type of Institution--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year				
		1968	1970	1972	1973	1974
All Institutions	143	$172	$215	$156	$146	$148
All Private Institutions	54	157	156	121	203	291
With Medical Schools	32	264	264	202	311	489
Without Medical Schools	22	2	0	3	46	1
All Public Institutions	89	181	250	177	112	63
With Medical Schools	34	178	294	286	205	104
Without Medical Schools	55	182	222	107	53	37
All with Medical Schools	66	219	280	246	256	288
All without Medical Schools	77	131	159	77	51	27

[a]Source: National Science Foundation.

Table 17A. Trends in Index Numbers for the Means of Federally Funded Expenditures for Research in Life Sciences Not Elsewhere Classified Shown in Table 17 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year				
		1968	1970	1972	1973	1974
All Institutions	143	110.2	137.9	100.0	93.8	95.2
All Private Institutions	54	130.1	129.3	100.0	167.9	240.4
With Medical Schools	32	130.6	130.4	100.0	153.6	242.0
Without Medical Schools	22	66.0	9.6	100.0	1837.3	49.5
All Public Institutions	89	102.1	141.4	100.0	63.5	35.8
With Medical Schools	34	62.2	102.7	100.0	71.6	36.5
Without Medical Schools	55	169.7	207.2	100.0	49.7	34.5
All with Medical Schools	66	89.0	113.5	100.0	103.8	117.1
All without Medical Schools	77	168.8	205.3	100.0	66.3	34.6

Federally funded R&D expenditures for psychology. Comparisons of means and index-number trends are shown in Tables 18 and 18A on the following page--for groups classified by type of control and medical-school status.

Federal R&D funds for psychology increased substantially (60 per cent) for all institutions combined between FY 1964 and 1968, but declined from an index level of 107.9 to 95.8 for FY 1974--a six-year drop of 11 per cent. This trend was in sharp contrast to that for biological sciences which turned upward after FY 1972 (Tables 15 and 15A). The general pattern for psychology resembled that for medical sciences up to FY 1973; but whereas federal R&D funds for the latter increased in FY 1974, those for psychology declined.

Private and public institutions differed somewhat in patterns of change in federal funding for psychology between FY 1964 and 1972--the differences being in the faster growth rate for public institutions and in a sharp drop for the private group in FY 1970. But between FY 1972 and 1974, the trends for both groups were alike: an increase for FY 1973 followed by a decline for FY 1974 (more marked for the private than for the public sector).

There was fairly close agreement between the trends for all institutions with and all without medical schools in federal funding for psychological research--as shown by the last two lines in Table 18A.

The comparisons of federal R&D funding trends in psychology by Carnegie Commission categories of institutions are shown in Appendix TABLES B-6 and B-6A. As with the biological and medical sciences, the funds are largely concentrated in Research Universities I, which means that the relatively small average amounts in the other two categories (both public and private)

Table 18. Trends in Mean Federally Funded Expenditures for Psychology by Type of Institution--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	$142	$227	$218	$210	$216	$202
All Private Institutions	54	164	204	183	193	198	178
With Medical Schools	32	233	236	219	230	235	210
Without Medical Schools	22	64	157	131	138	144	132
All Public Institutions	89	129	241	239	221	227	216
With Medical Schools	34	199	417	403	371	382	366
Without Medical Schools	55	86	132	138	128	132	122
All with Medical Schools	66	216	329	314	303	310	291
All without Medical Schools	77	80	139	136	131	135	125

[a]National Science Foundation.

Table 18A. Trends in Index Numbers for the Means of Federally Funded Research in Psychology Shown in Table 18 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Institutions	143	67.7	107.9	103.6	100.0	102.8	95.8
All Private Institutions	54	85.2	105.6	95.0	100.0	102.6	92.6
With Medical Schools	32	101.4	102.5	95.1	100.0	102.1	91.4
Without Medical Schools	22	46.1	113.3	94.7	100.0	103.8	95.3
All Public Institutions	89	58.5	109.0	108.2	100.0	102.9	97.5
With Medical Schools	34	53.7	112.3	108.8	100.0	102.9	98.7
Without Medical Schools	55	66.9	103.1	107.2	100.0	102.9	95.4
All with Medical Schools	66	71.3	108.7	103.7	100.0	102.6	96.0
All without Medical Schools	77	60.7	106.2	103.4	100.0	103.2	95.3

tend to fluctuate more erratically from year to year than that for the top category. Private Research Universities I had a relatively high level of federal funds for psychology R&D in 1964 as compared with public institutions in this category (index numbers of 84.6 and 58.1, respectively, in terms of the FY 1972 base). But the public group grew rapidly through FY 1970 as compared with the private sector (index of 114.2 vs. 92.4 for that year). Thereafter their trends followed fairly similar patterns through FY 1974, with the private group declining to a lower level than the public (91.3 vs. 98.9).

VI. TRENDS IN UNIVERSITY ENROLLMENTS

The enrollment statistics used in this study came from two HEGIS surveys conducted by the National Center for Education Statistics: (a) the survey of opening fall enrollment, which was limited primarily to numbers of students by educational level, sex, and full-time or part-time status; (b) the survey of enrollment for advanced degrees by academic discipline.

Trends in the following categories of enrollment have been analyzed by type of institution: total degree-credit enrollment; enrollment for advanced degrees in all fields; and enrollment for advanced degrees in biomedical-behavioral sciences--all fields combined, together with breakdowns into the three component fields included in this HEGIS survey: biological sciences, health professions (but not M.D.'s, D.D.S.'s, etc.), and psychology. It should be noted that the enrollment category "biomedical-behavioral" differs in composition from the NSF expenditure category of the same name in that "agriculture" is included in the latter composite but not in the former. This "mismatch" should be taken into account in evaluating comparisons between enrollment and financial trends. (The NSF category "life sciences not elsewhere classified" is also missing from the HEGIS classification of disciplines but these fields presumably are included among the "biological sciences.")

Following the plan used in the analyses of financial data, results are presented for two sets of institutional classification: (a) the subdivision of private and public universities by medical-school status; (b) the subdivision by categories of the Carnegie Commission on Higher Education. The tables of data for the first type of classification have been inserted into the text as

they are discussed, while those for the Carnegie Commission classification have been grouped into Appendix C. As was done in the preceding chapter on biomedical-behavioral expenditures, the discussion of the results for both types of breakdowns will be integrated by enrollment category.

Total Degree-Credit Enrollment

The variable used as a measure of total fall-term enrollment was the "head count" of all students registered for courses creditable towards a degree. Both on-campus and extension students were included, but not students enrolled for non-degree-credit courses. No distinction was made between full-time and part-time students.

Usable data were available for only eight of the 11 years covered in the present study--the omitted fiscal years being 1964, 1967, and 1968. The mean number of enrollments per institution is shown in Table 19 on the following page for the 147 institutions that supplied usable data--with breakdowns in terms of medical-school status. Comparative trends are shown in Table 19A, which presents index numbers for the means shown in Table 19 (with the mean for FY 1972 as the base).

All institutions combined. Total enrollment increased rapidly between FY 1965 and FY 1971 (from an average of 11,568 to 16,474), but levelled off thereafter through FY 1974. A comparison between the growth pattern for total enrollment and the trend in educational-and-general revenues is shown in the following index-number series for the two sets of means:

	1969	1970	1971	1972	1973	1974
Degree-credit enrollment	90.3	94.7	100.6	100.0	102.0	102.6
Total E&G revenues	92.1	95.7	97.7	100.0	100.0	102.3

Obviously, the relative growth rates for enrollment and E&G revenues over the six-year period are quite similar. But, as was noted earlier, the percentage increase in enrollment was slightly greater than that for E&G revenues (13.6 vs. 11.1 per cent).

Table 19. Trends in Mean Degree-Credit Enrollment by Type of Institution[a]

Type of Institution	Number	Fall Term of Fiscal Year							
		1965	1966	1969	1970	1971	1972	1973	1974
All Institutions	147	11,568	12,544	14,780	15,502	16,474	16,374	16,708	16,808
All Private Institutions	55	9,421	9,840	10,533	10,619	10,997	10,591	10,666	10,653
With Medical Schools	32	10,497	10,756	11,417	11,512	12,002	11,292	11,433	11,409
Without Medical Schools	23	7,925	8,564	9,302	9,376	9,599	9,617	9,598	9,603
All Public Institutions	92	12,851	14,162	17,320	18,421	19,748	19,831	20,320	20,487
With Medical Schools	35	15,654	17,486	20,684	22,086	23,701	23,528	24,071	24,496
Without Medical Schools	57	11,129	12,120	15,254	16,170	17,320	17,561	18,017	18,025
All with Medical Schools	67	13,191	14,272	16,258	17,035	18,113	17,684	18,035	18,245
All without Medical Schools	80	10,208	11,098	13,543	14,217	15,100	15,277	15,597	15,604

[a]Source: National Center for Education Statistics.

Table 19A. Trends in Index Numbers for the Means of Degree-Credit Enrollment Shown in Table 19 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year							
		1965	1966	1969	1970	1971	1972	1973	1974
All Institutions	147	70.6	76.6	90.3	94.7	100.6	100.0	102.0	102.6
All Private Institutions	55	89.0	92.9	99.4	100.3	103.8	100.0	100.7	100.6
With Medical Schools	32	93.0	95.3	101.1	101.9	106.3	100.0	101.3	101.0
Without Medical Schools	23	82.4	89.1	96.7	97.5	99.8	100.0	99.8	99.9
All Public Institutions	92	64.8	71.4	87.3	92.9	99.6	100.0	102.5	103.3
With Medical Schools	35	66.5	74.3	87.9	93.9	100.7	100.0	102.3	104.1
Without Medical Schools	57	63.4	69.0	86.9	92.1	98.6	100.0	102.6	102.6
All with Medical Schools	67	74.6	80.7	91.9	96.3	102.4	100.0	102.0	103.2
All without Medical Schools	80	66.8	72.6	88.6	93.1	98.8	100.0	102.1	102.1

Private vs. public institutions. Inspection of the trends for private and public institutions in Table 19A shows that the respective patterns differ significantly. The index numbers for all private institutions range from 89.0 in FY 1965 to 100.6 in FY 1974, whereas the corresponding indices for public institutions are 65.8 and 103.3. Moreover, the private institutions as a group had substantially reached a plateau by FY 1969 that was maintained at an index-level of about 100.0 until FY 1974 (except for a one-year increase to 103.8 in FY 1971).

It will be recalled from chapter III that the private and public trends in E&G revenue growth also differed significantly from FY 1969 through FY 1974. A comparative summary of the enrollment and revenue means for the two sectors is presented in the following tabulations of index numbers for the two types of data (from Tables 19-A and 5-A, respectively):

	1969	1970	1971	1972	1973	1974
Private Universities						
Degree-credit enrollment	99.4	100.3	103.8	100.0	100.7	100.6
Total E&G revenues	95.1	95.7	96.3	100.0	96.4	96.9
Public Universities						
Degree-credit enrollment	87.3	92.9	99.6	100.0	102.5	103.3
Total E&G revenues	89.5	95.7	99.0	100.0	103.2	107.1

Obviously from these figures, the E&G revenue trend for private institutions declined relative to enrollment level after FY 1972, whereas for public institutions the constant-dollar growth in revenue exceeded the rate of overall enrollment increase.

Presence vs. absence of medical schools. The degree-credit enrollment trend data in Table 19A do not show marked differences between universities with and those without medical schools--whether comparisons are made within the private sector, within the public sector, or for the two sectors combined.

Enrollment differences among Carnegie Commission categories of institutions. Data for the classification of the 147 institutions by the Carnegie Commission categories are shown in Appendix TABLES C-1 and C-1A. The comparative enrollments of the private and public institutions in these categories are shown in TABLE C-1--over the period from FY 1965 through 1974.

The comparative trend indices in TABLE C-1A show interesting differences among the private institutions in comparative growth rates. Research Universities I have index values of 98.0 for FY 1965 and 101.0 for FY 1974, showing little overall change. But during the three-year period 1969-1971 their enrollments rose appreciably above this plateau, as shown by the respective index numbers of 105.2, 106.2, and 109.5. The other two categories of private institutions began at levels considerably lower than Research Universities I, and showed fairly steady growth rates overall to FY 1971, levelling off thereafter.

Among the public institutions, the enrollment trends for the three Carnegie Commission categories had essentially similar patterns of growth from FY 1965 through FY 1974, with Research Universities I showing somewhat higher increases in FY 1971 and 1974.

Enrollment for Advanced Degrees in All Fields

Data on enrollment for advanced degrees by disciplines were available for only 121 institutions over the seven-year period (FY 1967-1973). Unfortunately, the computer tape with FY 1974 data had not been released in time for use in this study.

The mean numbers of enrollments for advanced degrees per institution for all graduate fields are shown in Tables 20 and 20A on the following page.

All institutions combined. The trend indices in Table 20A show that graduate enrollment increased from an index number of 79.2 in FY 1967 to 100.7 in FY 1973--an overall increase of 27 per cent. But there was essentially no growth after FY 1971 when the index number was 100.5.

Comparisons of the growth trend for advanced-degree enrollment with those shown earlier for all sponsored R&D revenues and for federally sponsored R&D revenues are made in the following figures:

	1969	1970	1971	1972	1973
Advanced-degree enrollment	91.6	96.9	100.5	100.0	100.7
All R&D revenues	102.1	101.6	96.8	100.0	99.9
Federal R&D revenues	106.2	104.2	96.4	100.0	98.7

The results of these comparisons may be summarized as follows: (a) over the five year period, enrollment for advanced degrees increased 10 per cent; (b) all R&D revenues decreased two per cent; (c) federally sponsored R&D revenues decreased 7.6 per cent. While the differences between the enrollment and revenue trends might seem to be small in magnitude, they probably were not negligible in impact upon the graduate departments of universities. Furthermore, the divergencies would very likely increase if data were available to carry the comparisons through the fiscal years 1974, 1975, and 1976.

Private vs. public institutions. Private institutions maintained a more nearly constant level of enrollment over the entire seven-year period than did the public institutions. Table 20A shows index changes from 87.9 to 101.0 for the former and from 73.9 to 100.5 for the latter. Moreover, private institutions had reached a plateau by FY 1970 while this occurred for the public institutions in FY 1971.

Table 20. Trends in Mean Enrollment for Advanced Degrees in All Fields by Type of Institution[a]

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	121	2,424	2,678	2,803	2,966	3,076	3,062	3,084
All Private Institutions	50	2,438	2,587	2,701	2,776	2,795	2,772	2,801
With Medical Schools	29	2,956	3,163	3,343	3,425	3,392	3,380	3,396
Without Medical Schools	21	1,723	1,793	1,815	1,881	1,970	1,933	1,980
All Public Institutions	71	2,413	2,742	2,875	3,099	3,274	3,265	3,283
With Medical Schools	30	3,287	3,706	3,815	4,092	4,289	4,181	4,152
Without Medical Schools	41	1,774	2,037	2,187	2,373	2,532	2,595	2,647
All with Medical Schools	59	3,124	3,439	3,583	3,764	3,848	3,788	3,780
All without Medical Schools	62	1,757	1,954	2,061	2,206	2,341	2,371	2,421

[a]Source: National Center for Education Statistics.

Table 20A. Trends in Index Numbers for the Means of Enrollment for Advanced Degrees in All Fields Shown in Table 20 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	121	79.2	87.5	91.6	96.9	100.5	100.0	100.7
All Private Institutions	50	87.9	93.3	97.4	100.1	100.8	100.0	101.0
With Medical Schools	29	87.5	93.6	98.9	101.3	100.3	100.0	100.5
Without Medical Schools	21	89.1	92.7	93.9	97.3	101.9	100.0	102.4
All Public Institutions	71	73.9	84.0	88.1	94.9	100.3	100.0	100.5
With Medical Schools	30	78.6	88.6	91.2	97.9	102.6	100.0	99.3
Without Medical Schools	41	68.4	78.5	84.3	91.5	97.6	100.0	102.0
All with Medical Schools	59	82.5	90.8	94.6	99.4	101.6	100.0	99.8
All without Medical Schools	62	74.1	82.4	86.9	93.1	98.8	100.0	102.1

There were no clear-cut or consistent relationships between R&D funding trends and trends in advanced-degree enrollment, for either private or public institutions. It may be recalled that all R&D revenues combined for the private sample tended to decline progressively from FY 1969 through 1973, whereas the opposite occurred for the public institutions (see Table 9A). In percentage terms, the mean of all R&D revenues declined about 9 per cent for private institutions and increased 10 per cent for public institutions, from FY 1969 through 1973. For federally sponsored R&D revenues, the percentage decline for private universities was about 14 per cent, while the public universities gained some 7 per cent over the same period (see Table 11A).

Presence vs. absence of medical schools. The figures in Table 20A show only slight differences in advanced-degree enrollment between trends for private institutions with and those without medical schools. In the case of public institutions, those without medical schools showed a relatively greater growth rate over the seven-year period than did institutions with medical schools. The former's index numbers ranged from 68.4 in FY 1967 to 102.0 in FY 1973 while for public universities with medical schools the corresponding range was from 78.6 to 99.3. The respective percentage increases were 49 and 26 per cent.

Advanced-degree enrollment by Carnegie Commission categories of institutions. Trend comparisons are shown in Appendix TABLES C-2 and C-2A for private and public institutions classified in the three Carnegie Commission groups. Research Universities showed the least amount of increase over the seven years, for both private and public universities (9 and 20 per cent, respectively).

The greatest growth rate occurred for "Other Categories" of public institutions, whose range in index numbers was from 59.2 in FY 1967 to 103.1 in FY 1973--an increase of 74 per cent. The corresponding gain for private universities was 22 per cent--a gain identical to that for private Research Universities II. For public Research Universities II, the seven-year increase was 44 per cent.

Enrollment for Advanced Degrees in Biomedical-Behavioral Sciences

As indicated at the beginning of this chapter, trend data will be presented separately for advanced-degree enrollment in the following classes of biomedical-behavioral disciplines: all biomedical-behavioral fields combined; biological sciences; health professions; psychology.

All biomedical-behavioral fields combined. The total number of institutions with records of enrollment for advanced degrees in biomedical-behavioral sciences from FY 1967 through FY 1973 was 119. The mean enrollments per institution over that period are shown in Table 21 on the following page, together with the corresponding index numbers for these means in Table 21A.

All institutions combined. There was a progressive increase for the aggregate of all institutions from an index value of 75.5 in FY 1967 to 105.2 in FY 1973--an increase of 39 per cent. The rate of increase for biomedical-behavioral sciences was thus considerably higher than that for all graduate fields combined (27 per cent).

The index numbers for advanced-degree enrollment may be compared with indices for mean R&D expenditures in biomedical-behavioral sciences (total and federally funded) for the years with data for both variables. The comparative figures for all biomedical-behavioral fields combined are as follows:

	1968	1970	1972	1973
Enrollment for advanced degrees	80.7	89.1	100.0	105.2
Total R&D expenditures	95.8	100.4	100.0	110.6
Federal R&D expenditures	103.3	105.6	100.0	112.4

The overall percentage increases from FY 1968 to FY 1973 for these three trend series are as follows: enrollment for advanced degrees, 30 per cent; total R&D expenditures, 16 per cent; federally funded R&D expenditures, 9 per cent.

Private vs. public institutions. The index trend for all private institutions shown in Table 21A parallels fairly closely that for all institutions combined--the increase from 82.8 in FY 1967 to 108.7 in FY 1973 being 32 per cent (as compared with 39 per cent for all institutions combined).

For all public institutions, the growth rate was higher than that for the private sector (43 versus 32 per cent). But the private universities increased 8.7 per cent from FY 1972 to 1973, in contrast to the public increase of 3.6 per cent.

Presence vs. absence of medical schools. The mean indices for combined private-public enrollment for advanced degrees shown in the last two lines of Table 21A indicate a greater gain for universities with than for those without medical schools (43 vs. 33 per cent).

Table 21. Trends in Mean Enrollment for Advanced Degrees in Biomedical-Behavioral Sciences by Type of Institution[a]

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	119	269	288	304	317	325	356	375
All Private Institutions	49	221	231	234	240	245	267	291
With Medical Schools	28	297	302	307	314	325	356	384
Without Medical Schools	21	120	135	138	142	137	149	165
All Public Institutions	70	303	328	353	372	382	419	434
With Medical Schools	30	418	447	484	517	538	602	634
Without Medical Schools	40	216	238	255	262	265	281	284
All with Medical Schools	58	359	377	399	419	435	483	514
All without Medical Schools	61	183	203	215	221	221	236	243

[a]Source: National Center for Education Statistics.

Table 21A. Trends in Index Numbers for Means of Enrollment for Advanced Degrees in Biomedical-Behavioral Sciences Shown in Table 21 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	119	75.5	80.7	85.3	89.1	91.3	100.0	105.2
All Private Institutions	49	82.8	86.4	87.6	89.9	91.6	100.0	108.7
With Medical Schools	28	83.4	85.0	86.1	88.2	91.4	100.0	108.0
Without Medical Schools	21	80.9	90.9	92.6	95.1	92.2	100.0	111.0
All Public Institutions	70	72.2	78.2	84.3	88.7	91.2	100.0	103.6
With Medical Schools	30	69.4	74.2	80.4	85.8	89.2	100.0	105.3
Without Medical Schools	40	76.8	84.7	90.6	93.3	94.4	100.0	100.9
All with Medical Schools	58	74.4	78.0	82.4	86.7	90.0	100.0	106.3
All without Medical Schools	61	77.7	86.1	91.0	93.7	93.9	100.0	103.1

But when similar percentages were calculated for the gains of private and public institutions separately, those for the public universities conformed to the pattern just described for the composite groups whereas the private universities showed a reverse trend.

Advanced-degree enrollment in all biomedical-behavioral fields by Carnegie Commission categories of institutions. These enrollment-trend data are shown in Appendix TABLES C-3 and C-3A. The trend index patterns for all of the Carnegie Commission categories of institutions combined--private and public--were generally quite similar: progressive growth in total advanced-degree enrollment from FY 1967 through FY 1973.

But there were significant differences in growth rates among the Carnegie Commission categories, which were similar for private and public universities: the "Other Categories" of institutions had considerably higher growth rates than Research Universities I and II. For private institutions, the latter two groups showed seven-year increases of 29 and 30 per cent, respectively, while the increase for "Other Categories" was 38 per cent. For the public institutions, the corresponding figures were 39 per cent for Research Universities I and II, and 65 per cent for "Other Categories."

Advanced-degree enrollment in biological sciences. The enrollment-trend data for graduate biological sciences are shown in Table 22 and 22A on the following page, and in Appendix TABLES C-4 and C-4A.

All institutions combined. Enrollment grew at a slow but fairly steady pace from FY 1967 through FY 1973. The overall increase was 16 per cent.

The following is a comparison of advanced-degree enrollment trends with those for R&D expenditures in biological sciences, for the years common to the two variables:

	1968	1970	1972	1973
Advanced-degree enrollment	92.6	98.1	100.0	101.7
Federal R&D expenditures	94.4	100.2	100.0	107.9

Private vs. public universities. Private institutions showed only slight growth in enrollment over the seven-year period (7 per cent), while the increase was 20 per cent for the public group.

Presence vs. absence of medical schools. The trend differences were slight between the composites of these two categories of institutions, with a single exception: from FY 1972 to 1973, institutions with medical schools increased four per cent in graduate biological-sciences enrollment while those without medical schools declined two per cent. The latter change occurred entirely in the public sector, as Table 22A shows.

Table 22. Trends in Mean Enrollment for Advanced Degrees in Biological Sciences by Type of Institution[a]

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	120	154	163	167	172	174	175	178
All Private Institutions	49	117	123	120	122	118	119	125
With Medical Schools	28	158	166	162	165	161	160	169
Without Medical Schools	21	63	66	64	65	60	64	68
All Public Institutions	71	179	190	199	206	212	215	215
With Medical Schools	30	226	238	246	254	266	271	280
Without Medical Schools	41	144	155	165	172	173	174	168
All With Medical Schools	58	193	203	206	211	215	217	226
All without Medical Schools	62	117	125	131	136	135	136	134

[a]Source: National Center for Education Statistics.

Table 22A. Trends in Index Numbers for the Means of Enrollment for Advanced Degrees in Biological Sciences Shown in Table 22 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	120	87.6	92.6	95.2	98.1	99.0	100.0	101.7
All Private Institutions	49	99.0	103.5	101.3	103.3	99.3	100.0	105.8
With Medical Schools	28	99.4	103.8	101.7	103.6	100.8	100.0	105.8
Without Medical Schools	21	97.9	102.8	99.9	102.1	94.5	100.0	105.7
All Public Institutions	71	83.3	88.5	92.9	96.2	98.9	100.0	100.1
With Medical Schools	30	83.3	87.7	90.9	93.6	98.1	100.0	103.1
Without Medical Schools	41	83.2	89.4	95.1	99.0	99.8	100.0	96.7
All with Medical Schools	58	89.0	93.4	94.7	97.2	99.0	100.0	104.1
All without Medical Schools	62	85.5	91.5	95.9	99.5	98.9	100.0	98.1

Differences by Carnegie Commission categories of institutions. The data for advanced-degree enrollment in biological sciences for the Carnegie Commission groupings are presented in Appendix TABLES C-4 and C-4A. The most marked characteristic of the three private categories is the inconsistency among their trend patterns. Research Universities I show an "oscillating" trend of increases and decreases (ending in FY 1973 at about its FY 1970 level, but with a seven-year increase of about 8 per cent, Research Universities II show an overall decline of 4 per cent, Other Categories show a generally upward trend, with a total increase of 11 per cent.

For the public institutions: Research Universities I increase from an index of 85.4 to 102.2 (20 per cent); Research Universities II had an increase of 16 per cent; Other Categories increased 28 per cent.

Advanced-degree enrollment in the health professions. The trend data in Tables 23 and 23A on the following page show two rather striking characteristics, for all institutions combined and for all of the sub-groups: (a) very high growth rates from FY 1967 through FY 1973; (b) generally steady increases from year to year (with very few "oscillations" in trend).

The overall magnitudes of the graduate-enrollment increases over the seven years are as follows:

All institutions combined.....136%
All private institutions.....117%
All public institutions.....146%
Institutions with medical schools.....143%
Institutions without medical schools.....107%

A comparison of trends in enrollment in health profession and in federal R&D funding for medical sciences is shown in the following index numbers for all institutions combined:

	1968	1970	1972	1973
Advanced-degree enrollment	50.0	62.8	100.0	110.7
Federal R&D expenditures	110.6	107.8	100.0	106.2

Table 23. Trends in Mean Enrollment for Advanced Degrees in Health Professions by Type of Institution[a]

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	120	44	47	53	59	65	94	104
All Private Institutions	49	41	43	48	50	57	80	89
With Medical Schools	28	58	60	69	73	84	118	129
Without Medical Schools	21	18	20	21	20	20	29	36
All Public Institutions	71	46	50	56	65	71	103	113
With Medical Schools	30	89	97	112	131	144	205	227
Without Medical Schools	41	13	14	14	15	17	27	28
All with Medical Schools	58	74	79	91	103	115	163	180
All without Medical Schools	62	15	16	16	17	18	28	31

[a]Source: National Center for Education Statistics.

Table 23A. Trends in Index Numbers for the Means of Enrollment for Advanced Degrees in Health Professions Shown in Table 23 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	120	46.6	50.0	56.5	62.8	69.?	100.0	110.7
All Private Institutions	49	51.2	53.5	60.7	62.9	70.8	100.0	112.0
With Medical Schools	28	49.3	50.8	58.8	61.8	71.4	100.0	109.9
Without Medical Schools	21	60.9	67.9	70.7	69.0	67.9	100.0	123.3
All Public Institutions	71	44.2	48.1	54.3	62.8	69.2	100.0	110.0
With Medical Schools	30	43.3	47.2	54.7	63.9	70.5	100.0	111.1
Without Medical Schools	41	49.1	53.4	51.9	56.3	61.9	100.0	103.6
All with Medical Schools	58	45.4	48.5	56.1	63.2	70.8	100.0	110.7
All without Medical Schools	62	53.4	58.7	58.7	60.9	64.1	100.0	110.8

The data for advanced-degree enrollment in the health professions by Carnegie Commission categories are given in Appendix TABLES C-5 and C-5A. Most of the enrollments are concentrated in Research Universities I and II, for both private and public universities. Their respective growth trends were quite different, however, as the index numbers in Table C-5A indicate. In overall percentage terms (FY 1967 through FY 1973) the differences are as follows:

	Research Univ. I	Research Univ. II
Private universities	166%	70%
Public universities	106%	245%

Advanced-degree enrollment in psychology. The means and index numbers for graduate psychology enrollments are shown in Tables 24 and 24A on the following page, with breakdowns by type of control and medical-school status. The comparative magnitudes of the overall enrollment increases from FY 1967 through FY 1974 are as follows:

All institutions combined.....32%
All private institutions.....21%
All public institutions.....37%
Institutions with medical schools.....17%
Institutions without medical schools.....52%

Comparisons of advanced-degree enrollments in psychology for institutions classified by Carnegie Commission categories are shown in Appendix TABLES C-6 and C-6A. Inspection of the index-number trends indicates that Research Universities I, private and public, had the lowest rates of growth over the seven-year period, while Other Categories had the highest. The following overall percentages confirm these impressions:

	Research Universities I	Research Universities II	Other Categories
Private universities	6%	28%	41%
Public universities	215	32	70

Table 24. Trends in Mean Enrollment for Advanced Degrees in Psychology by Type of Institution[a]

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	120	72	78	86	88	88	89	95
All Private Institutions	49	63	65	66	68	70	69	76
With Medical Schools	28	80	77	75	76	81	79	86
Without Medical Schools	21	40	50	53	56	57	56	61
All Public Institutions	71	79	88	100	103	100	103	108
With Medical Schools	30	103	113	126	133	127	127	128
Without Medical Schools	41	61	69	81	81	80	86	93
All with Medical Schools	58	92	95	101	105	105	104	108
All without Medical Schools	62	54	63	71	72	72	75	82

[a]Source: National Center for Education Statistics.

Table 24A. Trends in Index Numbers for the Means of Enrollment for Advanced Degrees in Psychology Shown in Table 24 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Institutions	120	81.4	88.1	96.4	99.1	98.8	100.0	106.2
All Private Institutions	49	91.5	94.9	95.4	98.1	102.2	100.0	109.9
With Medical Schools	28	101.9	97.8	95.2	96.6	102.1	100.0	109.5
Without Medical Schools	21	72.0	89.4	95.8	100.9	102.3	100.0	110.6
All Public Institutions	71	76.7	85.0	96.9	99.6	97.3	100.0	104.5
With Medical Schools	30	81.5	88.7	99.4	104.6	100.5	100.0	100.6
Without Medical Schools	41	71.4	80.9	94.2	94.2	93.7	100.0	108.8
All with Medical Schools	58	89.0	92.1	97.9	101.6	101.1	100.0	103.8
All without Medical Schools	62	71.6	83.0	94.6	95.9	95.9	100.0	109.3

VII. TRENDS IN EARNED DOCTORAL DEGREES

Statistics were available for each of the 11 years from FY 1964 through FY 1974 for earned doctoral degrees in all fields, with breakdowns by academic disciplines in accordance with the NCES-HEGIS classification the number of institutions in the present sample having complete records for each of these years, however, was reduced to 102. The present chapter is limited to doctoral degrees in all fields combined and to those in the biomedical-behavioral fields. (M.D.'s, D.D.S.'s and similar professional doctorates were not included.)

Trends in Earned Doctoral Degrees in All Fields Combined

The mean number of doctoral degrees granted per institution and the corresponding index numbers for these means are shown in Tables 25 and 25A on the following page.

Doctoral degrees by types of institutions. The number of earned doctorates increased significantly over the 11-year period from FY 1964 through FY 1974 for all classes of institutions in the sample, as indicated by the following summary of overall percentage increases based on the means in Table 25:

All institutions.....220%
All private institutions.....167
All public institutions.....265
All with medical schools.....214
All without medical schools.....221

Private vs. public universities. The index numbers in Table 25A show generally similar trends for private and public universities. However, the rate of growth was lower for the private than for the public sector--as indicated by the overall percentage increases from FY 1964 through FY 1974.

Presence vs. absence of medical schools. There appeared to be no significant differences in the growth trends in earned doctorates over the 11-year period when private and public institutions with or without medical schools, respectively, were combined. Within the private and public

Table 25. Trends in Mean Number of Earned Doctoral Degrees in All Fields by Type of Institution[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	66	76	122	141	155	175	196	208	212	218	211
All Private Institutions	45	75	82	127	145	157	173	189	199	200	207	200
With Medical Schools	25	92	100	162	188	205	225	242	257	261	271	255
Without Medical Schools	20	52	60	83	92	97	107	123	126	123	126	131
All Public Institutions	57	60	70	119	138	153	177	202	215	221	226	219
With Medical Schools	23	61	69	119	140	160	180	209	229	222	232	227
Without Medical Schools	34	59	71	119	137	148	175	197	206	220	222	214
All with Medical Schools	48	77	85	141	165	184	203	226	243	242	252	242
All without Medical Schools	54	57	67	106	120	129	150	169	176	184	186	183

[a]Source: National Center for Education Statistics.

Table 25A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in All Fields Shown in Table 25 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	31.4	35.7	57.9	66.8	73.1	82.8	92.7	98.3	100.0	102.8	99.6
All Private Institutions	45	37.3	41.1	63.6	72.8	78.7	86.6	94.7	99.5	100.0	103.5	100.0
With Medical Schools	25	35.3	38.2	62.1	71.9	78.6	86.3	92.6	98.2	100.0	103.8	97.5
Without Medical Schools	20	42.7	48.8	67.5	75.4	79.0	87.4	100.1	102.9	100.0	103.0	106.6
All Public Institutions	57	27.1	31.9	53.8	62.5	69.1	80.1	91.3	97.4	100.0	102.3	99.2
With Medical Schools	23	27.4	31.2	53.5	63.1	72.1	81.0	94.3	103.1	100.0	104.8	102 5
Without Medical Schools	34	26.9	32.4	54.0	62.1	67.0	79.5	89.3	93.5	100.0	100.6	97.0
All with Medical Schools	48	31.9	35.1	58.3	68.0	75.8	84.0	93.3	100.4	100.0	104.2	99.7
All without Medical Schools	54	30.8	36.5	57.4	65.4	70.0	81.4	92.0	95.8	100.0	101.2	99.4

sectors, however, there seemed to be conflicting trends which had the effect of cancelling each other so as to produce the apparent result of no difference for the combined figures. For example, private institutions without medical schools grew somewhat more rapidly after FY 1969 than those with medical schools; whereas the opposite was true for public institutions. But the magnitude of these variations was not great.

Carnegie Commission categories of institutions. The trends in mean number of earned doctorates for institutions classified by three Carnegie Commission categories are shown in Appendix TABLES D-1 and D-1A. As would be expected, since the number of doctorates granted was a criterian used in creating this hierarchy, Research Universities I (both private and public) had by far the largest mean number of doctorates among the three groups used in the present study.

In terms of growth rates, however, the percentage changes from FY 1964 to FY 1974 showed a markedly inverse relationship to the order of the groups in the classification hierarchy--as indicated by the following percentage increases between FY 1964 and FY 1974 in mean number of doctoral degrees granted:

	Private Institutions	Public Institutions
Research Universities I	142%	203%
Research Universities II	241	342
Other Categories	295	615

Comparison of doctorates with R&D revenues. From FY 1969 through FY 1974, earned doctoral degrees for all institutions combined increased, as already noted, while sponsored R&D revenues declined. The trends over the years common to the respective data series are shown in the following index numbers:

	1969	1970	1971	1972	1973	1974
Earned doctoral degrees	82.8	92.7	98.3	100.0	102.8	99.6
All sponsored R&D revenues	102.1	101.6	96.8	100.0	99.9	95.9
Federally sponsored R&D revenues	106.2	104.2	96.4	100.0	98.7	94.5

In terms of percentage change over the six-year period, the following are the comparative figures: earned doctorates, 20% increase; all sponsored R&D revenues, 6% decrease; federally sponsored R&D revenues, 10% decrease.

Trends in Earned Doctoral Degrees in Biomedical-Behavioral Sciences

It will be recalled that the composite category "biomedical-behavioral sciences" based on the NCES-HEGIS enrollment survey included biological sciences, health professions, and psychology. The same set of biomedical-behavioral disciplines was included in the survey of earned doctorates and has been used in this analysis.

Trend data will be reported first for all biomedical-behavioral fields combined. Then separate results will be presented for biological sciences and psychology. The numbers of doctorates in the health professions were so small that they will not be discussed, although tables showing means and index numbers have been included in the text and in Appendix D.

Doctorates in all biomedical-behavioral fields combined. The statistics on earned doctoral degrees are shown in Tables 26 and 26A on the following page. It should be noted that because of the small average number of doctorates granted per year in this category, rounding to whole numbers in Table 26 has sometimes produced apparent inconsistencies with the corresponding index numbers in Table 26A. The discrepancies may also have been due partly to the fact that the index numbers were computed as the means of the index numbers for individual institutions, rather than directly from the group means in Table 26.

The number of doctorates granted in biomedical-behavioral sciences has increased at a substantially lower rate than the number of doctorates for all fields. The 11-year percentage changes for the classification of institutions by type of control and medical-school status were as follows:

Table 26. Trends in Mean Number of Earned Doctoral Degrees in Biomedical Behavioral Sciences by Type of Institution[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	18	20	22	25	28	32	34	37	37	37	37
All Private Institutions	45	17	17	18	22	24	25	27	29	29	30	31
With Medical Schools	25	25	24	26	32	34	36	38	42	41	42	44
Without Medical Schools	20	7	8	8	10	11	12	13	14	14	15	15
All Public Institutions	57	20	22	25	28	31	38	40	43	43	43	42
With Medical Schools	23	23	25	27	29	36	41	45	48	49	49	50
Without Medical Schools	34	17	21	23	26	28	35	36	39	39	39	37
All with Medical Schools	48	24	24	27	30	35	38	42	45	45	46	47
All without Medical Schools	54	13	16	18	20	22	27	27	30	30	30	29

[a]Source: National Center for Education Statistics.

Table 26A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in Biomedical-Behavioral Sciences Shown in Table 26 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	50.1	54.5	59.9	68.4	75.9	87.8	92.8	100.9	100.0	102.0	102.0
All Private Institutions	45	57.9	58.8	63.3	76.0	82.4	87.4	92.9	101.7	100.0	105.2	107.2
With Medical Schools	25	60.3	58.6	64.4	78.2	83.4	87.3	93.3	102.4	100.0	104.4	107.3
Without Medical Schools	20	49.5	59.7	59.4	68.2	78.8	87.6	91.5	99.3	100.0	107.8	106.7
All Public Institutions	57	46.0	52.2	58.1	64.4	72.5	88.1	92.8	100.5	100.0	100.2	99.3
With Medical Schools	23	47.3	50.9	56.1	59.4	73.1	84.0	97.8	98.8	100.0	100.5	102.4
Without Medical Schools	34	44.8	53.2	59.9	68.7	72.0	91.5	92.8	102.0	100.0	100.0	96.6
All with Medical Schools	48	53.5	54.6	60.0	68.3	78.0	85.6	93.0	100.5	100.0	102.4	104.7
All without Medical Schools	54	45.6	54.4	59.8	68.6	73.2	90.8	92.5	101.5	100.0	101.4	98.4

All 102 institutions.....106%
All private institutions..... 82
All public institutions.....110
Institutions with medical schools..... 96
Institutions without medical schools....123

Private vs. public universities. The trend patterns of index numbers for the several categories of institutions shown in Table 26A were generally similar through FY 1972. Thereafter, however, private institutions showed moderate increases in biomedical-behavioral doctorates through FY 1974, whereas there was little change in the public sector except for a decline for public universities without medical schools.

Carnegie Commission categories of institutions. The trends in mean number of earned doctorates in biomedical-behavioral sciences for institutions classified by three Carnegie Commission categories are shown in Appendix TABLES D-2 and D-2A.

The most striking result shown in these tables is the fact that public Research Universities I showed a substantial decline in doctorates, from an index number of 100 in FY 1972 to 93.1 in FY 1974. Since both of the other public categories showed increased during this period, the difference between private and public institutions noted in the preceding section was due entirely to the decline in doctorates for public Research Universities I.

Over the entire 11-year period, however doctorate production by the Carnegie Commission categories of public institutions increased at a greater overall rate than those for the corresponding private groups, as the following percentage changes from FY 1964 to FY 1974 show:

	Private	Public
Research Universities I	71%	75%
Research Universities II	83	164
Other Categories	225	300

Comparison of trends in doctoral degrees with R&D expenditures in biomedical-behavioral sciences. Whereas the trends for the number of earned doctorates and federally sponsored R&D revenues for all fields combined went in opposite directions, the corresponding comparisons for all biomedical-behavioral fields show generally similar patterns of increase for doctorate production and R&D expenditures. The following index numbers summarize the results for the years common to the three variables listed:

	1964	1968	1970	1972	1974
Earned doctoral degrees	50.1	75.9	92.8	100.0	102.8
Total sponsored research expenditures	75.7	95.8	100.4	100.0	109.0
Federally sponsored research expenditures	76.9	103.3	105.6	100.0	107.6

It is particularly interesting that both total and federal R&D expenditures increased at considerably more rapid rates between FY 1972 and 1974 than did doctorate production. (Such direct comparisons should be made in recognition of the fact that a time lag would be expected to intervene between funding input and doctoral output if a causal relationship between these two variables is assumed to exist.)

Doctorates in biological and psychological sciences.[8] It will be convenient to discuss the data on earned doctorates in the biological sciences and in psychology together, partly to emphasize the marked contrast in trends between the two fields from FY 1972 to 1974. But first the overall percentage changes in doctorates granted from FY 1964 through FY 1974 will be compared by types of institutions. (The percentages shown earlier for all biomedical-behavioral fields will also be reproduced.)

	Biomedical-Behavioral Sciences	Biological Sciences	Psychology
All 102 institutions	106%	100%	117%
All private institutions	82	89	71
All public institutions	110	117	133
Institituions with medical schools	96	86	78
Institutions without medical schools	123	100	150

Trend data are shown in Tables 27-27A (biological sciences) and Tables 29-29A (psychology). The two sets of index numbers (Tables 27A and 29A) differ in one major respect between FY 1964 and FY 1972: the biological sciences began at a lower level in FY 1964 (relative to their FY 1972 base) and hence

[8]It was noted above that too few doctoral degrees were granted in the health professions to justify any discussion of trends in these fields. But trend data are shown for them in Tables 28 and 28A and in Appendix TABLES D-4 and D-4A.

Table 27. Trends in Mean Number of Earned Doctoral Degrees in Biological Sciences by Type of Institution[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	11	13	14	15	18	20	22	24	24	23	22
All Private Institutions	45	9	10	10	12	15	15	16	18	18	17	17
With Medical Schools	25	14	14	14	17	22	20	23	26	25	24	25
Without Medical Schools	20	4	5	5	5	7	8	7	8	8	8	8
All Public Institutions	57	12	15	16	18	21	25	26	28	28	28	26
With Medical Schools	23	14	17	18	18	23	27	29	31	31	30	28
Without Medical Schools	34	12	14	15	18	20	24	25	26	26	26	24
All with Medical Schools	48	14	16	16	18	22	23	26	28	28	27	26
All without Medical Schools	54	9	10	12	13	15	18	18	20	20	20	18

[a]Source: National Center for Education Statistics.

Table 27A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in Biological Sciences Shown in Table 27 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	47.0	54.7	57.5	64.5	78.3	87.2	92.7	100.9	100.0	98.2	93.2
All Private Institutions	45	52.7	55.6	56.6	67.5	85.4	81.9	91.1	102.1	100.0	96.6	96.5
With Medical Schools	25	54.7	55.5	55.8	69.2	87.4	79.0	91.7	102.4	100.0	96.7	97.5
Without Medical Schools	20	45.2	56.0	59.5	61.3	78.0	92.9	88.7	101.2	100.0	96.4	92.9
All Public Institutions	57	44.1	54.3	58.0	63.0	74.8	89.8	93.4	100.3	100.0	98.9	91.6
With Medical Schools	23	43.7	56.0	56.9	57.7	73.0	85.7	93.0	99.3	100.0	97.3	92.0
Without Medical Schools	34	44.4	52.9	58.8	67.2	76.2	93.0	93.8	101.1	100.0	100.2	91.2
All with Medical Schools	48	48.8	55.8	56.4	63.1	79.8	82.6	92.4	100.7	100.0	97.0	94.6
All without Medical Schools	54	44.6	53.4	58.9	66.3	76.5	93.0	93.0	101.1	100.0	99.6	91.5

Table 28. Trends in Mean Number of Earned Doctoral Degrees in Health Professions by Type of Institution[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	1	1	1	2	1	1	2	2	2	2	3
All Private Institutions	45	0	1	1	1	1	1	1	2	1	1	2
With Medical Schools	25	1	1	1	1	1	1	2	3	2	2	3
Without Medical Schools	20	0	0	0	0	0	0	0	0	0	1	0
All Public Institutions	57	2	2	2	2	2	2	2	3	3	3	3
With Medical Schools	23	2	2	2	2	2	3	3	5	5	4	5
Without Medical Schools	34	1	1	2	2	1	2	2	2	2	2	2
All with Medical Schools	48	1	1	2	2	2	2	3	4	3	3	4
All without Medical Schools	54	1	1	1	1	1	1	1	1	1	1	1

[a]Source: National Center for Education Statistics.

Table 28A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in Health Professions Shown in Table 28 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	44.6	49.1	65.8	69.8	56.8	67.6	86.0	108.1	100.0	93.2	117.6
All Private Institutions	45	23.6	41.8	41.8	61.8	50.9	65.5	89.1	134.5	100.0	101.8	147.3
With Medical Schools	25	26.5	46.9	46.9	69.4	57.1	73.5	95.9	136.7	100.0	91.8	149.0
Without Medical Schools	20	-	-	-	-	-	-	33.3	116.7	100.0	183.3	133.3
All Public Institutions	57	51.5	51.5	73.7	72.5	58.7	68.3	85.0	99.4	100.0	90.4	107.8
With Medical Schools	23	41.9	36.2	52.4	54.3	54.3	59.0	71.4	101.9	100.0	93.3	106.7
Without Medical Schools	34	67.7	77.4	109.7	103.2	66.1	83.9	108.1	95.2	100.0	85.5	109.7
All with Medical Schools	48	37.0	39.6	50.6	59.1	55.2	63.6	79.2	113.0	100.0	92.9	120.1
All without Medical Schools	54	61.8	70.6	100.0	94.1	60.3	76.5	101.5	97.1	100.0	94.1	111.8

Table 29. Trends in Mean Number of Earned Doctoral Degrees in Psychology by Type of Institution[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	6	6	7	8	8	10	10	11	11	12	13
All Private Institutions	45	7	7	8	9	8	10	10	10	10	12	12
With Medical Schools	25	10	9	11	13	11	14	13	13	14	16	16
Without Medical Schools	20	3	4	3	4	5	5	5	5	5	7	7
All Public Institutions	57	6	6	6	8	8	10	11	12	12	12	14
With Medical Schools	23	8	6	7	9	11	12	13	13	13	15	17
Without Medical Schools	34	4	5	6	7	7	9	9	11	11	11	11
All with Medical Schools	48	9	8	9	11	11	13	13	13	13	16	16
All without Medical Schools	54	4	5	5	6	6	8	8	9	9	9	10

[a]Source: National Center for Education Statistics.

Table 29A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in Psychology Shown in Table 29 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Institutions	102	58.0	55.1	64.0	76.6	74.5	93.3	94.5	99.6	100.0	111.8	117.8
All Private Institutions	45	71.4	66.7	77.9	92.9	80.8	99.8	96.7	96.9	100.0	120.8	121.2
With Medical Schools	25	75.5	66.1	82.9	96.2	79.6	104.7	95.9	97.3	100.0	120.6	119.5
Without Medical Schools	20	58.7	68.8	62.4	82.6	84.4	84.4	99.1	95.4	100.0	121.1	126.6
All Public Institutions	57	49.0	47.2	54.7	65.7	70.3	88.9	93.1	101.3	100.0	105.8	115.6
With Medical Schools	23	57.5	44.2	55.5	64.9	79.5	88.6	99.7	96.8	100.0	110.4	125.0
Without Medical Schools	34	41.8	49.9	54.0	66.3	62.4	89.1	87.5	105.3	100.0	101.9	107.5
All with Medical Schools	48	66.9	55.6	69.9	81.3	79.6	97.1	97.7	97.1	100.0	115.8	122.1
All without Medical Schools	54	45.7	54.3	56.0	70.1	67.5	88.0	90.2	103.0	100.0	106.4	112.0

had a somewhat more rapid growth rate than psychology. But within each discipline, the index numbers for the various sub-groups show fairly consistent increases, although numerous irregularities occurred in individual years in both tables.

The principal differences between the two fields, however, is that the mean numbers of doctorates granted in psychology increased markedly after FY 1972 while those in the biological sciences declined. For all institutions combined, the increase for psychology was 17.9 per cent whereas the biological sciences decreased 6.8 per cent during the two-year period. These divergent trends were rather uniformaly reflected in the indices for all of the sub-groups shown in Tables 27A (biological sciences) and 29A (psychology).

Comparisons of doctoral trend data for these two sets of disciplines, by the Carnegie Commission classification of institutions, are shown in Appendix TABLES D-3 and D-3A (biological sciences) and TABLES D-5 and D-5A (psychology). The overall increases between FY 1964 and 1974 are summarized in terms of the following percentages:

	Biological Sciences	Psychology
Private Institutions		
Research Universities I	75%	42%
Research Universities II	28	140
Other Categories	300	150
Public Universities		
Research Universities I	80	58
Research Universities II	110	225
Other Categories	267	300

VIII. TRENDS IN THE FUNDING PATTERNS OF NIH AND ADAMHA

In the recent report of the National Science Board to the President,[9] it is stated that biomedical research accounts for some 90 per cent of the federal obligations for health-related R&D in FY 1974, the greater part of which is funded by the nine National Institutes of Health. A second category, mental health, is reported to account for five per cent of the remainder--all of which is the responsibility of ADAMHA's National Institute of Mental Health. NIH and ADAMHA account for almost all federally funded "biomedical-behavioral" R&D, which in turn is the source of funds for most academic research in these fields.

In addition to R&D support, these two agencies also provide funds to universities for several other purposes; and changes in the distribution of their awards among funding categories can have serious effects upon institutional programs. The purpose of this chapter is to analyze trends in the funding patterns of NIH and ADAMHA and in the levels of support for the various categories of awards over the seven-year period for which data were available.

Computerized records of the funding obligations for both agencies since 1969, have been maintained in NIH's IMPAC files, and data from these files have been secured for 145 of the 148 universities involved in the present study.

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[9] Science Indicators, 1974, The National Science Board/National Science Foundation, 1975.

Three types of trend analysis have been used: (a) percentage distributions by type of funding mechanism for each of the seven fiscal years; (b) trends in the mean amounts awarded per university for each category of award over the seven fiscal years; (c) trends in the respective percentages of funds awarded for direct and for indirect costs by funding mechanism.

Trends in the Distribution of Awards by Funding Mechanism

The trends in percentage distribution of awards by funding mechanism are shown for NIH in Table 30 and for ADAMHA in Table 31 on the following page.

NIH funding distributions. The percentages in Table 30 show that NIH awards have gone predominantly for regular research grants to individual faculty members. The proportion of the total amount awarded in this category has increased steadily from 59 per cent in FY 1969 to 71.2 per cent in FY 1975. (The maximum was 71.9 per cent in FY 1973.)

The category with the next largest proportion was training grants, which has shown a decline from 18.6 per cent of the total in FY 1969 to 11.9 per cent in FY 1975. The related category of fellowships has also followed a predominantly downward trend: from 8.3 per cent in FY 1969 to a low point of 2 per cent in FY 1973, followed by an increase to 3.8 per cent in FY 1975.

There has been no appreciable change in the relative level of support for "program project grants," whose proportion of NIH awards to the 145 universities increased from 8.1 per cent in FY 1969 to 11.8 per cent in FY 1972, followed by a decline to 8.7 per cent in FY 1975.

Table 30. Trends in Percentage Distributions for NIH Awards by Funding Mechanism to 145 Universities[a]

Funding Mechanism	Fiscal Year						
	1969	1970	1971	1972	1973	1974	1975
Regular Research Grants	59.0%	59.7%	61.9%	65.5%	71.9%	70.3%	71.2%
Program Project Grants	8.1	9.6	11.0	11.8	10.0	8.5	8.7
Clinical Research Grants	1.2	1.2	1.3	0.4	0.4	0.3	0.3
Training Grants	18.6	18.0	15.8	14.9	11.4	14.2	11.9
Faculty Awards	3.0	3.3	3.3	3.1	3.4	2.3	2.6
Fellowships	8.3	6.3	5.2	3.1	2.0	3.2	3.8
Other Awards	1.8	1.9	1.5	1.2	0.9	1.2	1.5
All Categories	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 31. Trends in Percentage Distributions for ADAMHA Awards by Funding Mechanism to 145 Universities[a,b]

Funding Mechanism	Fiscal Year						
	1969	1970	1971	1972	1973	1974	1975
Regular Research Grants	35.6%	33.3%	36.1%	38.1%	44.3%	39.8%	42.0%
Program Project Grants	3.2	4.3	4.3	4.1	3.9	5.2	2.4
Clinical Research Grants	--	--	--	--	--	--	--
Training Grants	44.2	43.8	44.0	42.5	42.2	45.5	39.3
Faculty Awards	2.5	2.7	2.5	2.2	2.1	1.4	1.4
Fellowships	11.0	11.5	7.9	8.0	3.1	3.0	8.9
Other Awards	3.5	4.4	5.1	5.1	4.4	5.1	6.0
All Categories	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a] Source: National Institutes of Health, IMPAC files.

[b] It should be noted that ADAMHA's training grants are made largely for clinical training in such areas as psychiatry, clinical psychology, psychiatric nursing and paraprofessional training. Unlike NIH training grants, only a small proportion of ADAMHA's grants in this category are for research training.

ADAMHA funding distributions. It is evident from the data in Table 31 that ADAMHA has had quite a different pattern of distribution of awards to universities from that shown by NIH. Regular research grants have received a far smaller proportion of ADAMHA's total awards to universities--the indices ranging from 35.6 per cent in FY 1969 to 42 per cent in FY 1975. The highest proportion of ADAMHA's university funding has gone for training grants (heavily for clinical training in mental health specialities)--the percentages remaining fairly stable over the seven-year period (44.2 per cent in FY 1969 and 39.3 per cent in FY 1975).

Relatively more of ADAMHA's funds have gone for fellowships than was the case with NIH, but the trends for the two agencies have been generally similar. ADAMHA's fellowship percentage declined from 11 per cent in FY 1969 to 3 per cent in FY 1973 but then jumped to 8.9 per cent in FY 1975.

Trends in Amounts of NIH Awards to Universities by Funding Mechanisms

The percentage distributions of funds by years give no indication of the levels of support in dollars provided to the institutions for the various types of funding mechanisms. In order to determine the trends in the amounts of funds awarded, averages (means) have been computed in constant dollars for each funding category over the seven-year period for all institutions combined. The results for NIH are shown in Table 32 on the following page. From the mean amounts in Table 32, index numbers have been computed for each funding category--using the mean for FY 1972 as the base--and these indices are shown in Table 32A. For example, the mean total award per institution for regular research grants in FY 1969 was $326 thousand in constant dollars, and by FY 1975 the mean had

Table 32. Trends in Mean NIH Awards to 145 Universities by Funding Mechanism--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Funding Mechanism	Fiscal Year						
	1969	1970	1971	1972	1973	1974	1975
Regular Research Grants	$325.6	$301.6	$331.0	$369.9	$361.2	$427.3	$439.8
Program Project Grants	44.8	48.5	58.8	66.4	50.2	51.7	53.8
Clinical Research Grants	6.5	6.2	6.8	2.0	2.1	2.1	1.8
Training Grants	102.3	91.2	84.5	84.3	57.5	86.1	73.5
Faculty Awards	16.7	16.8	17.8	17.5	17.0	14.0	16.3
Fellowships	46.0	31.7	27.8	17.7	9.8	19.3	23.2
Other Awards	9.6	9.4	8.0	6.9	4.7	7.5	8.9
All Categories	551.4	505.4	534.0	564.8	502.4	608.5	617.3

[a]Source: National Institutes of Health, IMPAC files.

Table 32A. Trends in Index Numbers for the Means of NIH Awards Shown in Table 32 (Means for FY 1972 = 100)

Funding Mechanism	Fiscal Year						
	1969	1970	1971	1972	1973	1974	1975
Regular Research Grants	88.0	81.5	89.3	100.0	97.6	115.6	118.8
Program Project Grants	67.4	73.1	88.4	100.0	75.5	77.7	81.0
Clinical Research Grants	325.3	312.4	341.7	100.0	103.0	104.1	90.9
Training Grants	121.2	108.0	100.2	100.0	68.1	102.1	87.2
Faculty Awards	95.2	95.6	99.7	100.0	97.1	79.8	93.1
Fellowships	259.2	178.6	156.9	100.0	54.9	108.8	130.5
Other Awards	139.4	136.0	115.5	100.0	68.2	109.2	128.2
All Categories	97.6	89.4	94.5	100.0	88.9	107.7	109.3

increased to $440 thousand (a gain of 35 per cent in real dollars). In the case of training grants, on the other hand, there was a decrease from $102 thousand in FY 1969 to $73.5 thousand in 1975 (a decline of 28 per cent).

For all categories combined, NIH had a relatively small increase in average amount per university from $551 thousand in FY 1969 to $617 thousand in FY 1975 (12 per cent).

Trends in Amounts of ADAMHA Awards to Universities by Funding Mechanisms

Comparisons of ADAMHA funding mechanisms in terms of trends in the mean amounts of awards are shown in Tables 33 and 33A on the following page. By contrast with NIH funding levels, almost all of the ADAMHA funding categories showed declines over the seven-year period. For example, the mean amount awarded for regular research grants declined from $78.2 thousand in FY 1969 to $68.8 thousand in FY 1975 (a decrease of 12 per cent). Training grants similarly declined from a mean of $96.9 thousand in FY 1969 to $64.4 thousand in FY 1975 (a drop of 34 per cent).

Unlike NIH, ADAMHA suffered an overall decline in constant dollars in its awards to this sample of universities: from $219.4 thousand in FY 1969 to $163.8 thousand in FY 1975--a decrease of 25 per cent.

Trends in Direct and Indirect Costs

The IMPAC files contain separate records of funds expended for direct and indirect costs from all awards--for both NIH and ADAMHA. Based upon the total dollar amounts awarded to the entire sample of 145 universities, percentages have been computed for the two types of costs, by funding mechanism and fiscal year. The results are presented in Table 34 (for NIH) and Table 35 (for ADAMHA) on the following two pages.

Table 33. Trends in Mean ADAMHA Awards to 145 Universities by Funding Mechanism--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Funding Mechanism	Fiscal Year						
	1969	1970	1971	1972	1973	1974	1975
Regular Research Grants	$ 78.2	$ 68.4	$ 68.7	$ 71.2	$ 69.9	$ 73.2	$ 68.8
Program Project Grants	7.1	8.7	8.3	7.7	6.2	9.6	4.0
Clinical Research Grants	--	--	--	--	--	--	--
Training Grants	96.9	89.9	83.7	79.4	66.6	83.7	64.4
Faculty Awards	5.5	5.5	4.9	4.2	3.3	2.6	2.2
Fellowships	24.0	23.7	15.1	14.9	4.9	5.5	14.6
Other Awards	7.6	9.1	9.6	9.5	6.9	9.5	9.8
All Categories	219.4	205.2	190.3	186.9	157.8	184.1	163.8

[a]Source: National Institutes of Health, IMPAC files.

Table 33A. Trends in Index Numbers for the Means of ADAMHA Awards Shown in Table 33 (Means for FY 1972 = 100)

Funding Mechanism	Fiscal Year						
	1969	1970	1971	1972	1973	1974	1975
Regular Research Grants	109.7	95.9	96.4	100.0	98.1	102.8	96.5
Program Project Grants	92.9	114.0	107.8	100.0	80.7	125.3	52.2
Clinical Research Grants	--	--	--	--	--	--	--
Training Grants	122.0	113.1	105.4	100.0	83.8	105.3	81.0
Faculty Awards	132.7	131.7	117.9	100.0	79.1	63.0	53.1
Fellowships	160.7	158.5	100.7	100.0	32.7	36.5	97.6
Other Awards	79.7	95.7	101.1	100.0	72.5	99.5	103.6
All Categories	117.3	109.7	101.8	100.0	84.4	98.4	87.6

Table 34. Trends in Direct and Indirect Costs as Percentages of Total NIH Awards to 145 Universities by Funding Mechanism[a]

Funding Mechanism	Fiscal Year						
	1969	1970	1971	1972	1973	1974	1975
Regular Research Grants							
Direct Cost	78.3%	76.5%	75.6%	74.4%	73.2%	72.5%	73.5%
Indirect Cost	21.7	23.5	24.4	25.6	26.8	27.5	26.5
Program Project Grants							
Direct Cost	81.8	82.2	81.8	80.0	76.1	76.7	74.3
Indirect Cost	18.2	17.8	18.2	20.0	23.9	23.3	25.7
Clinical Research Grants							
Direct Cost	98.2	98.7	98.5	93.0	94.6	95.2	94.9
Indirect Cost	1.8	1.3	1.5	7.0	5.4	4.8	5.1
Training Grants							
Direct Cost	93.8	93.9	94.0	94.1	94.2	94.2	94.2
Indirect Cost	6.2	6.1	6.0	5.9	5.8	5.8	5.8
Faculty Awards							
Direct Cost	94.3	94.9	95.8	97.4	98.0	98.3	98.8
Indirect Cost	5.7	5.1	4.2	2.6	2.0	1.7	1.2
Fellowships							
Direct Cost	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Indirect Cost	--	--	--	--	--	--	--
Other Awards							
Direct Cost	98.8	97.0	94.5	85.5	80.7	81.3	86.8
Indirect Cost	1.2	3.0	5.5	14.5	19.3	18.7	13.2
All Categories							
Direct Cost	84.3	83.0	81.7	79.8	77.4	77.6	78.0
Indirect Cost	15.7	17.0	18.3	20.2	22.6	22.4	22.0

[a]Source: National Institutes of Health, IMPAC files.

Table 35. Trends in Direct and Indirect Costs as Percentages of Total ADAMHA Awards to 145 Universities by Funding Mechanism[a]

Funding Mechanism	Fiscal Year						
	1969	1970	1971	1972	1973	1974	1975
Regular Research Grants							
Direct Cost	76.8%	75.2%	75.0%	73.7%	72.6%	72.6%	72.3%
Indirect Cost	23.2	24.8	25.0	26.3	27.4	27.4	27.7
Program Project Grants							
Direct Cost	76.5	72.4	71.8	70.2	72.3	70.3	70.0
Indirect Cost	23.5	27.6	28.2	29.8	27.7	29.7	30.0
Clinical Research Grants							
Direct Cost	--	--	--	--	--	--	--
Indirect Costs	--	--	--	--	--	--	--
Training Grants							
Direct Cost	94.2	94.0	94.0	94.0	94.0	94.0	94.0
Indirect Cost	5.8	6.0	6.0	6.0	6.0	6.0	6.0
Faculty Awards							
Direct Cost	92.7	92.7	92.4	92.8	92.6	97.8	92.7
Indirect Cost	7.3	7.3	7.6	7.2	7.4	7.2	7.3
Fellowships							
Direct Cost	98.7	97.4	95.1	94.8	88.7	86.4	95.5
Indirect Cost	1.3	2.6	4.9	5.2	11.3	13.6	4.5
Other Awards							
Direct Cost	76.4	76.6	80.0	80.0	81.9	80.2	83.3
Indirect Cost	23.6	23.4	20.0	20.0	18.1	19.8	16.7
All Categories							
Direct Cost	87.2	86.4	85.5	84.6	82.9	83.3	83.8
Indirect Cost	12.8	13.6	14.5	15.4	17.1	16.7	16.2

[a]Source: National Institutes of Health, IMPAC files.

The most significant category for the evaluation of trends in indirect costs is that of regular research grants--partly because most of the NIH funds are in that category. The figures in Table 34 show that the percentage of research grants allocated for indirect costs increased from 21.7 per cent in FY 1969 to 27.5 per cent in FY 1974--declining to 26.5 per cent in FY 1975. The indirect-cost trend was quite similar for ADAMHA research grants (see Table 35): ranging from 23.2 per cent in FY 1969 to 27.7 per cent in FY 1975.

The trend results are generally similar in the case of program project grants. For NIH, the indirect-cost proportions increased from 18.2 to 25.7 per cent over the seven-year period; while for ADAMHA the corresponding increase was from 23.5 per cent in FY 1969 to 30 per cent in FY 1975.

(The determinants of the division of costs into the direct and indirect components are so variable for the remainder of the funding categories that discussion of the remainder of the results in Tables 34 and 35 hardly seems justified.)

There are several reasons why indirect costs have increased more rapidly than the direct costs of research in recent years. Probably the most significant has been the differential effects of inflation on the two types of R&D expenditures. The direct-cost component has a higher proportion of salaries and wages than the indirect-cost sector; and the former has been increasing at lower rates than the non-personnel elements of the latter. Price increases for utilities (especially fuel costs), books and periodicals, and other non-personnel items have escalated sharply in recent years, whereas incr ases in staff compensation have been at far lower rates. Another factor has been the marked

increases in administrative costs (mostly classified as indirect costs) and other costs due to federally mandated social programs such as equal employment opportunity, occupational safety and health, enviornmental protection, and fair-labor standards. Compliance with regulations governing the use of human subjects and animals in experimentation adds especially to both the direct and indirect costs of biomedical-behavioral research. And the increasingly detailed information requirements under grants and contracts have added substantially to the indirect costs of sponsored research.

IX. SUMMARY AND CONCLUSIONS

The primary purpose of this study was to investigate relationships between trends in federal funding of biomedical-behavioral research in universities and concurrent financial and educational changes in these institutions from FY 1964 through FY 1974. It was assumed that more detailed knowledge of these interrelationships would provide guidance to federal agencies and to universities in their interdependent efforts to sustain academic research in the health fields at a high level of national effectivenss.

The analytical framework for the investigation involved two modes of trend comparisons: (a) differences among various types of institutions in patterns of change in a given financial or educational variable; (b) concurrent changes in two or more variables for a given type of institution.

The sample of 148 universities had a "three-dimensional" structure: (a) type of control (public, private); (b) medical-school status (presence, absence); (c) classification in terms of involvement in doctoral education and research. Fifty-five of the university campuses were private and 80 were public in governance. Sixty-eight had medical schools under their campus jurisdiction. The entire sample comprised all but nine of the 145 institutions in the top three categories of the classification system developed by the Carnegie Commission on Higher Education. (The nine omissions from the latter were due to large amounts of missing data.) Twelve institutions from other Carnegie Commission categories were included because eight of them had medical schools and the other four were members of multi-campus institutions whose aggregate data seemed likely to be useful in certain of the anticipated analyses.

The statistical information used in the study included several types of financial and nonfinancial data spanning the period from FY 1964 through FY 1974. More than 150 data elements were sought from the files of four federal and two private agencies, covering each of the 11 years and all institutions in the sample. Unfortunately, the quantity of data available fell short of the desired amount for several reasons: (a) most of the surveys did not span the entire 11-year period and some that did were conducted intermittently; (b) changes in the definitions of data elements occurred in certain surveys; (c) many institutions failed to supply data for one or more years in a series; (d) numerous changes occurred in the identity of the reporting unit, mainly in the case of multi-campus institutions. Moreover, the quality of the data varied considerably among agencies and sometimes among the data files of a single agency.

Summary of Findings

Despite the limitations of the data base, it was possible to complete a wide range of trend analyses which disclosed important differences among the variables by type of institution.

Trends in educational-and-general (E&G) revenues. The importance of disaggregating the results for the composite sample of research universities into relatively homogenous sub-groups was strongly demonstrated by the analysis of the data for E&G revenues.

1. For the entire group of 100 institutions, E&G revenues in constant dollars increased slowly every year from FY 1969 through 1974 (except FY 1973 when there was essentially no change). The overall gain was 11.1 per cent.

2. Dividing the sample into private and public universities showed gains of 2.0 per cent for the private and 19.7 per cent for the public universities over the seven years.

3. Particularly striking were the differences between the private and public institutions from FY 1972 through FY 1974: private E&G revenues declined 3.1 per cent, while public E&G revenues gained 7.1 per cent.

4. Analysis of E&G revenues for the private institutions by the categories of the Carnegie Commission showed that Research Universities I accounted for all of the decrease for the private sector from FY 1972 to 1974. Research Universities II and "Other Categories" had increases of 2.5 and 6.5 per cent, respectively.

The proportion of E&G revenues supplied by R&D funds. Both total and federally funded R&D revenues for the sample of 100 universities declined moderately as proportions of E&G revenues, from FY 1969 through 1974: from 21 to 19 per cent for total R&D funds, and from 18 to 15 per cent for federal R&D funds. From these figures it can be calculated that federal R&D funds dropped from 86 to 79 per cent of total R&D revenues during the six years. Other specific findings:

1. R&D funds constituted a much higher percentage of the E&G funds of private than of public universities (e.g., 28 vs. 16 per cent in FY 1969 for total R&D, and 24 vs. 13 per cent for federal R&D funds).

2. Institutions with medical schools had higher proportions of R&D funds than those without medical schools (e.g., 24 vs. 19 per cent for total R&D revenues, and 20 vs. 16 per cent for federal R&D funds in FY 1969).

Trends in sponsored R&D revenues for all fields. Consistent with the findings just discussed, the mean amount per institution of total and of federal R&D funds in constant dollars declined over the six-year period for all institutions combined (6.1 per cent for total and 10.2 per cent for federal R&D funds).

1. Private institutions accounted for all of the decline in R&D funds, however, as with E&G funds discussed earlier. From FY 1969 to 1974, private institutions suffered declines of 12 per cent in total R&D funds and of 17 per cent in federal R&D funds. Public institutions, on the other hand, gained about five per cent in total R&D funds and less than one per cent in federal funds.

2. Most of the decline in R&D funding for private institutions occurred in those without medical schools. But for public institutions, their small increases were associated with absence of medical schools.

3. Unlike the trends found for E&G revenues, private universities showed no appreciable differences when grouped into the three Carnegie Commission categories.

Expenditures for biomedical-behavioral research. Results are summarized first for R&D expenditures in all biomedical-behavioral fields combined and then for three of the disciplines recognized in NSF's expenditures survey (see Chapter V):

1. Total R&D funding for all biomedical-behavioral sciences combined showed a marked upturn of 10.6 per cent in FY 1973 (followed by a slight decline from that level in FY 1974), in sharp contrast to trends in other fields. Both private and public universities showed similar patterns. Institutions without medical schools fared better generally than those with medical schools.

2. The trends for federally funded biomedical-behavioral expenditures were similar to those for all R&D funding in these fields; but the federal component showed a sharper upturn of over 12 per cent in FY 1973 (for private and public universities combined), followed by a decline in FY 1974 averaging about 5 per cent. Most of the sub-groups of institutions showed parallel trends.

3. Among the disciplines within the biomedical-behavioral complex, the most marked upturn in federal funding in FY 1973 for all institutions combined occurred for the biological sciences (22 per cent); but more than half of that gain was lost in the following year.

Federal funding for medical sciences increased moderately in FY 1973 (6 per cent), but showed a further rise in FY 1974 to 10 per cent above the FY 1972 level.

Psychology had a slight increase in federal R&D funds of about 3 per cent in FY 1973, but then a drop in 1974 of almost 5 per cent below the FY 1972 level.

An analysis of NIH awards for basic research grants to 145 universities in the sample showed an overall increase from FY 1969 through 1975 of 35 per cent. Although these obligation figures are not strictly in phase with NSF's biomedical expenditure data, it is interesting to note that the latter's total increase over the six years was 40 per cent for federally funded R&D.

A seven-year increase of 35 per cent in NIH funds awarded for regular research grants was paralleled by an increase of 22 per cent in the proportion of the grant totals allocated for indirect costs. Thus the constant-dollar increase in funds available for the direct costs of research was reduced to 27 per cent.

Trends in enrollment. Three types of fall-term enrollment statistics were analyzed: total degree-credit enrollment; enrollment for advanced degrees in all fields combined; enrollment for advanced degrees in biomedical-behavioral sciences.

1. Total degree-credit enrollment. For all institutions combined, total enrollment exhibited fairly steady growth from the fall term of 1965 through 1971, with a further increase of only two per cent through FY 1974. E&G revenue increases from FY 1969 through 1974 showed a growth of 11.1 per cent and a parallel growth of 13.6 per cent in enrollment occurred for the same six-year period.

The enrollment trends for private and public universities differed considerably: private institutions showed almost no change over the six-year period, while enrollment increased about 18 per cent for the public universities. Within each group, there were only slight differences among the three Carnegie Commission categories.

2. Enrollment for advanced degrees in all fields (not including professional degrees in medicine, etc.). The general growth patterns of enrollment for graduate degrees for all institutions combined were similar to those for total degree-credit enrollment. (No data for advanced-degree enrollment were available for FY 1974.) Growth was fairly steady from the fall term of 1967 through 1971, leveling off thereafter.

Private institutions tended to maintain parity with public institutions in enrollment growth at the graduate level; and presence or absence of a medical school made little difference. Moreover, there were no significant differences among the Carnegie Commission categories in advanced-degree enrollment.

While graduate enrollment increased about 10 per cent from FY 1969 to 1973, R&D revenues declined (2 per cent for all sources of funds and about 7 per cent for federal funds).

3. Enrollment for advanced degrees in biomedical-behavioral sciences. As compared with enrollment for advanced degrees in all fields, the rate of growth was substantially higher for the biomedical-behavioral sciences. Growth did not level off in 1971, but instead continued through the fall term of 1973. Private institutions showed slightly higher rates of growth than their public counterparts after 1970: 8.7 per cent in 1973 over 1972 vs. 3.6 per cent for public universities.

From FY 1968 through 1973, biomedical-behavioral enrollment increased more rapidly than federal R&D funding in these fields (30 per cent vs. 11 per cent). But between FY 1972 and 1973, the corresponding increases were 5 and 12 per cent.

Trends in doctoral degrees (not including M.D.'s, D.D.S.'s, etc.). In view of the irregular relationship between number of doctorates granted and financial data for a given year, no comparisons of trend indices for the two sets of variables will be included here.

1. Doctoral degrees in all fields. There was fairly steady growth in the mean number of doctorates granted by all institutions combined from FY 1964 through FY 1973, with a leveling off or slight drop in FY 1974. The trend for private universities was similar to that for the public sample. But when institutions within these two groups were classified by presence or absence of a medical school, the private and public groups showed somewhat opposite trends: private institutions with medical schools showed a lower growth rate (and a decline in 1974); whereas the public institutions with medical schools had somewhat higher average increases than those without medical schools over most of the 11-year period.

2. Doctoral degrees in biomedical-behavioral sciences. For all institutions combined, the mean index was higher before FY 1971 relative to the base year (FY 1972) for biomedical-behavioral doctorates than for all fields combined; and the former's growth after FY 1970 was at a somewhat higher rate than the latter's. But the differential favoring the biomedical-behavioral fields was not as great as the parallel comparison involving total enrollment for advanced degrees.

The private universities showed substantially higher growth rates than public universities for biomedical-behavioral doctorates after FY 1971. For the public institutions, these degrees levelled off after FY 1971. Institutions with medical schools showed increases after FY 1972, while those without them declined slightly.

General Conclusions

The findings of this study have not provided, unfortunately, a conclusive answer to the critical question of whether the nation's research universities can continue to sustain an adequate level of health-related research with their present resources and financial prospects. This indeterminancy stems partly from the terminal year of FY 1974 for the data base, which meant that the effects of the downturn in the national economy during that year and since could not be fully reflected in the financial analysis. But deficiencies in the quantity and quality of the information available were also important barriers to a more definitive determination of that issue.

Nevertheless, several key findings seem to justify the conclusion that the financial condition of private research universities--especially those described as Research Universities I in the Carnegie Commission's classification--has been deteriorating in recent years under the joint impacts of cost inflation and recession in revenues.

Although the public universities through FY 1974 appear to have maintained a stable or slightly increased constant-dollar level of revenues, the latter did not quite keep pace with enrollment increases. Furthermore, an earlier ACE study based on expenditures per full-time-equivalent student showed that when the constant-dollar analysis was extended through FY 1975, all public institutions showed declines and all categories of private institutions showed further erosion from the level to which they had been reduced in FY 1974. It seems probable that this negative trend has continued into the current year in both sectors.

Contributing to these financial difficulties has been the decline in federal R&D funds as proportions of total educational budgets--more severe for private than for public universities and especially sharp for both in FY 1974. Since the growing financial pressures upon institutional budgets as a whole would not allow universities generally to use other revenues to offset declines in federal R&D funding, it seems reasonable to conclude that the overall R&D base of research universities may have suffered serious impairment.

The one area that showed a positive R&D funding trend in this study was the biomedical-behavioral sciences. They had moderate revenue increases in constant dollars, especially between FY 1972 and 1974, in both public and private universities. Whether or not this trend has continued is unknown. Nor is there direct evidence bearing upon the impact of the funding growth in these fields upon the financial and educational resources of the universities as a whole. It is a plausible hypothesis, however, that unilateral R&D growth in the health fields--accompanied, as has occurred, by substantial expansion in training programs for the health professions--probably has put strong pressure upon university budgets already under stresses caused by inflation/recession.

An important contributor to this burden has been the requirement of sharing in the cost of academic research supported by federal grants. Limitations upon the full recovery of the indirect costs of federally sponsored research has created a related drain upon university resources at a time of rapid price escalation in such costs--much of the latter due to federally mandated social programs and to compliance with other kinds of federal regulations.

The effects of inflation on all costs of research, together with the disproportionate increase in the indirect-cost components, have serious implications for academic science departments and federal program directors who share an interest in maximizing the amount and quality of research produced with available funds. The inevitable result of expending fixed amounts of grant funds to meet such costs is to lower research "productivity" as measured by the proportionate level of investment in direct scientific effort. It is natural for department heads and federal program directors to try to avoid such an outcome, which is likely to mean putting pressure upon institutions to accept grants with as much cost-sharing as can be negotiated. Although understandable, this kind of practice cannot be continued without aggravation of the serious financial difficulties facing research universities. Among these problems are the generation of undesirable budgetary conflicts among departments and competition for funds needed for such campus-wide purposes as faculty compensation, libraries, and plant maintenance.

These and other problems arising from the interrelations between federal research agencies and universities need to be more intensively studied in order to establish a sounder foundation for long-range policies and programs fostering their mutual interests. The kind of "macroscopic" information used in the present study can at best discover broad trends, identify puzzling problems, and suggest speculative hypotheses. Far more detailed knowledge of intra-institutional "dynamics" is necessary to an adequate understanding of the "impact" upon university finances and programs of such federal policies as cost sharing, sudden changes in funding levels, and major shifts in program priorities.

During the 1960s, in an expanding educational economy, universities could usually manage to adapt to such changes without undue disruption of their educational programs or damage to their financial stability. This is no longer the case. And if universities are to continue to perform their distinctive role in the national research effort effectively, new ways and means must be found to encourage more productive interaction between the federal government and academic institutions in pursuit of their common research goals.

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APPENDIX A

CLASSIFICATION OF THE 148 INSTITUTIONS IN THE ACE-RAND SAMPLE BY THE CATEGORIES OF THE CARNEGIE COMMISSION ON HIGHER EDUCATION[a,b]

PRIVATE INSTITUTIONS

Research Universities I

California Institute of Technology
Case Western Reserve University (M)
Columbia University, Main Division (M)
Cornell University (M)
Duke University (M)
Harvard University (M)
Johns Hopkins University (M)
Massachusetts Institute of Technology
New York University (M)
Northwestern University (M)
Princeton University
Rockefeller University
Stanford University (M)
University of Chicago (M)
University of Miami (M)
University of Pennsylvania (M)
University of Rochester (M)
University of Southern California (M)
Vanderbilt University (M)
Washington University (M)
Yale University (M)
Yeshiva University (M)

Research Universities II

Brandeis University
Brown University (M)
Boston University (M)
Carnegie-Mellon University
Catholic University of America
Claremont Graduate School
Emory University, Main Campus (M)
George Washington University (M)
Illinois Institute of Technology
Rice University
Syracuse University
Tufts University (M)
Tulane University of Louisiana (M)

Doctoral Universities I

American University
Boston College
Brigham Young University
Dartmouth College (M)
Fordham University
Georgetown University (M)
Howard University (M)
Lehigh University
Loyola University (M)
Marquette University
Northeastern University
Pennsylvania Drexel University
Rensselaer Polytechnic
St. John's University
St. Louis University, Main Campus (M)
University of Denver
University of Notre Dame

Other Categories

Creighton University (M)
Loma Linda University (M)
Wake Forest University (M)

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[a] Carnegie Commission on Higher Education. A Classification of Institutions of Higher Education. Berkeley, Calif.: Carnegie Commission on Higher Education, 1973.

[b] The institutions listed are generally on single campuses, and those with medical schools under campus jurisdiction are designated by "(M)".

PUBLIC INSTITUTIONS

Research Universities I

Michigan State University (M)
North Carolina State Univ., Raleigh
Ohio State University, Main Campus (M)
Purdue University, Main Campus
Rutgers University, New Brunswick (M)
Texas Agricultural & Mechanical Univ.
University of Arizona (M)
University of California, Berkeley
University of California, Davis (M)
Univ. of California, Los Angeles (M)
University of California, San Diego (M)
University of Colorado (M)
University of Florida (M)
University of Georgia
University of Hawaii, Main Campus (M)
University of Illinois, Urbana
University of Iowa (M)
University of Kentucky, Main Campus (M)
Univ. of Maryland, College Park
Univ. of Michigan, Main Campus (M)
Univ. of North Carolina, Chapel Hill (M)
Univ. of Pittsburgh, Main Campus (M)
University of Tennessee, Knoxville
University of Texas, Austin
University of Utah (M)
University of Washington (M)
University of Wisconsin, Madison (M)

Research Universities II

Auburn University, Main Campus
City Univ. of N.Y., Graduate Center
Colorado State University
Florida State University
Georgia Institute of Technology
Indiana University, Bloomington
Iowa State Univ. of Science & Tech.
Kansas State Univ. of Agriculture and Applied Science
Louisiana State Univ., Baton Rouge
Mississippi State University
Oklahoma State University
Oregon State University
State Univ. of N.Y., Buffalo
Temple University, Main Campus (M)
Univ. of Arkansas, Main Campus
Univ. of Cincinnati, Main Campus (M)
Univ. of Connecticut, All (M)
University of Kansas (M)
Univ. of Massachusetts, Amherst
Univ. of Nebraska, Lincoln
Univ. of Oklahoma, (M)
University of Oregon, Main Campus
University of Virginia, All (M)
Virginia Polytechnic Inst. & State Univ.
Washington State University
Wayne State University (M)
West Virginia University (M)

Doctoral Universities I

Arizona State University
Ball State University
Clemson University,
Kent State University, Main Campus
Montana State University
New Mexico State Univ., Main Campus
North Dakota State Univ., Main Campus
Ohio University, Main Campus
Southern Illinois Univ., Main Campus (M)
State Univ. of New York, Albany
State Univ. of N.Y., Stony Brook
University of Alabama, Main Campus
University of California, Riverside
University of California, Santa Barbara
University of Delaware
University of Houston, Main Campus
University of Idaho
University of Louisville (M)
University of Maine, Orono
University of Mississippi (M)
University of New Hampshire
University of New Mexico, Main Campus
University of North Dakota, Main Campus
University of Rhode Island
Univ. of South Carolina, Main Campus
University of South Dakota, Main Campus (M)
University of Southern Mississippi
Univ. of Vermont & State Agric. College (M)
University of Wyoming
Utah State University

PUBLIC INSTITUTIONS (cont.)

Other Categories

Texas Technological University (M)
University of Alabama, Birmingham (M)
University of Illinois, Chicago Circle
University of Nevada, Reno (M)
Univ. of Puerto Rico, Rio Piedras
University of South Florida (M)
University of Texas, Arlington
University of Wisconsin, Milwaukee
Virginia Commonwealth University (M)

APPENDIX B

TABLES SHOWING EXPENDITURES FOR BIOMEDICAL-BEHAVIORAL RESEARCH FOR INSTITUTIONS CLASSIFIED BY CATEGORIES OF THE CARNEGIE COMMISSION ON HIGHER EDUCATION

TABLE B-1. Trends in Mean Expenditures for All Biomedical-Behavioral Research by Carnegie Commission Categories of Institutions--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	$ 4,265	$ 5,694	$ 5,693	$ 6,033	$ 6,545	$ 6,390
Research Universities I	22	8,368	11,370	11,565	12,802	13,795	13,542
Research Universities II	13	2,170	2,546	2,525	2,162	2,501	2,387
Other Categories	19	948	1,276	1,062	843	918	848
All Public Institutions	89	3,809	4,643	5,036	4,794	5,383	5,340
Research Universities I	26	7,956	9,598	11,301	10,502	11,736	11,297
Research Universities II	27	3,520	4,609	4,144	4,055	4,436	4,662
Other Categories	36	1,031	1,088	1,180	1,227	1,505	1,547

[a] Source: National Science Foundation.

TABLE B-1A. Trends in Index Numbers for the Means of All Biomedical-Behavioral Research Expenditures Shown in TABLE B-1 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	70.7	94.4	94.4	100.0	108.5	105.9
Research Universities I	22	65.4	88.8	90.3	100.0	107.8	105.8
Research Universities II	13	100.4	117.8	116.8	100.0	115.7	110.4
Other Categories	19	112.4	151.4	126.0	100.0	108.9	100.6
All Public Institutions	89	79.5	96.8	105.0	100.0	112.3	111.4
Research Universities I	26	75.8	91.4	107.6	100.0	111.8	107.6
Research Universities II	27	86.8	113.7	102.2	100.0	109.4	115.0
Other Categories	36	84.0	88.7	96.2	100.0	122.7	126.7

TABLE B-2. Trends in Mean Federally Funded Expenditures for Biomedical-Behavioral Research by Carnegie Commission Categories of Institutions--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	$ 3,465	$ 4,711	$ 4,520	$ 4,522	$ 5,045	$ 4,878
Research Universities I	22	6,765	9,412	9,119	9,473	10,522	10,246
Research Universities II	13	1,824	2,151	2,116	1,751	2,074	1,955
Other Categories	19	768	1,019	840	686	736	662
All Public Institutions	89	2,185	2,907	3,148	2,835	3,210	3,044
Research Universities I	26	4,685	6,257	7,503	6,626	7,596	6,858
Research Universities II	27	1,896	2,719	2,231	2,041	2,165	2,257
Other Categories	36	596	630	691	693	827	880

[a]Source: National Science Foundation.

TABLE B-2A. Trends in Index Numbers for the Means of Federally Funded Biomedical-Behavioral Research Expenditures Shown in TABLE B-2 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	76.6	104.2	100.0	100.0	111.6	107.9
Research Universities I	22	71.4	99.4	96.3	100.0	111.1	108.2
Research Universities II	13	104.2	122.9	120.9	100.0	118.5	111.7
Other Categories	19	112.0	148.5	122.4	100.0	107.2	96.5
All Public Institutions	89	77.1	102.5	111.0	100.0	113.2	107.4
Research Universities I	26	70.7	94.4	113.2	100.0	114.6	103.5
Research Universities II	27	92.9	113.2	109.3	100.0	106.1	110.6
Other Categories	36	86.1	90.9	99.8	100.0	119.3	127.0

TABLE B-3. Trends in Mean Federally Funded Expenditures for Biological Research by Carnegie Commission Categories of Institutions--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	$1,107	$1,599	$1,540	$1,704	$1,996	$1,966
Research Universities I	22	2,153	3,312	3,222	3,489	4,248	4,110
Research Universities II	13	637	637	613	713	617	643
Other Categories	19	219	275	225	315	332	388
All Public Institutions	89	1,103	1,342	1,519	1,414	1,778	1,448
Research Universities I	26	2,292	2,763	3,674	3,303	4,193	2,987
Research Universities II	27	985	1,344	1,102	1,075	1,223	1,242
Other Categories	36	332	313	274	305	450	490

[a]Source: National Science Foundation.

TABLE B-3A. Trends in Index Numbers for the Means of Federally Funded Expenditures for Biological Research Shown in TABLE B-3 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	65.0	93.9	90.4	100.0	117.2	115.4
Research Universities I	22	61.7	94.9	92.4	100.0	121.8	117.8
Research Universities II	13	89.3	89.4	86.1	100.0	86.6	90.3
Other Categories	19	69.6	87.2	71.5	100.0	105.5	123.2
All Public Institutions	89	78.0	94.9	107.4	100.0	125.7	102.4
Research Universities I	26	69.4	83.6	111.3	100.0	126.9	90.4
Research Universities II	27	91.7	125.1	102.5	100.0	113.8	115.6
Other Categories	36	109.1	102.7	89.9	100.0	147.6	160.8

TABLE B-4. Trends in Mean Federally Funded Expenditures for Medical Research by Carnegie Commission Categories of Institutions--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	$2,194	$2,751	$2,641	$2,505	$2,648	$2,443
Research Universities I	22	4,288	5,638	5,325	5,367	5,555	5,211
Research Universities II	13	1,075	1,172	1,287	849	1,072	1,018
Other Categories	19	534	487	460	323	360	213
All Public Institutions	89	953	1,142	1,138	1,021	1,092	1,317
Research Universities I	26	2,123	2,485	2,705	2,351	2,741	3,322
Research Universities II	27	793	1,064	778	703	618	724
Other Categories	36	228	230	275	299	255	314

[a]Source: National Science Foundation.

TABLE B-4A. Trends in Index Numbers for the Means of Federally Funded Expenditures for Medical Research Shown in TABLE B-4 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	87.6	109.8	105.4	100.0	105.7	97.5
Research Universities I	22	79.9	105.1	99.2	100.0	103.5	97.1
Research Universities II	13	126.6	138.0	151.5	100.0	126.2	119.8
Other Categories	19	165.3	150.7	142.5	100.0	111.5	65.9
All Public Institutions	89	93.3	111.8	111.4	100.0	106.9	129.0
Research Universities I	26	90.3	105.7	115.0	100.0	116.6	141.3
Research Universities II	27	112.8	151.3	110.7	100.0	87.9	102.9
Other Categories	36	76.4	77.1	92.2	100.0	85.4	105.0

TABLE B-5. Trends in Mean Federally Funded Expenditures for Research in Life Sciences not Elsewhere Classified, by Carnegie Commission Categories of Institutions--Constant Dollars in Thousands (NIH P&D Deflator, FY 1964 = 100)

Type of Institution	Number	Fiscal Year				
		1968	1970	1972	1973	1974
All Private Institutions	54	$157	$145	$121	$203	$291
Research Universities I	22	106	218	234	325	575
Research Universities II	13	161	104	96	287	212
Other Categories	19	214	121	7	5	15
All Public Institutions	89	181	250	177	112	63
Research Universities I	26	479	591	507	178	89
Research Universities II	27	113	175	79	136	111
Other Categories	36	21	65	17	49	10

[a]Source: National Science Foundation.

TABLE B-5A. Trends in Index Numbers for the Means of Expenditures for Research Life Sciences not Elsewhere Classified Shown in TABLE B-5 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year				
		1968	1970	1972	1973	1974
All Private Institutions	54	130.1	129.3	100.0	167.9	240.4
Research Universities I	22	45.2	93.2	100.0	138.9	245.8
Research Universities II	13	168.1	108.5	100.0	299.3	221.6
Other Categories	19	3014.7	1698.8	100.0	65.4	208.3
All Public Institutions	89	102.1	141.4	100.0	63.5	35.8
Research Universities I	26	94.5	116.8	100.0	35.2	17.5
Research Universities II	27	141.9	220.4	100.0	171.2	140.1
Other Categories	36	125.2	394.6	100.0	294.5	63.2

TABLE B-6. Trends in Mean Federally Funded Expenditures for Research in Psychology by Carnegie Commission Categories of Institutions--Constant Dollars in Thousands (NIH R&D Deflator, FY 1964 = 100)[a]

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	$164	$204	$183	$193	$198	$178
Research Universities I	22	324	356	354	383	394	350
Research Universities II	13	111	181	113	93	99	82
Other Categories	19	15	42	33	41	39	46
All Public Institutions	89	129	241	239	221	227	216
Research Universities I	26	271	531	532	466	483	461
Research Universities II	27	118	197	176	184	188	180
Other Categories	36	36	64	75	72	72	65

[a]Source: National Science Foundation.

TABLE B-6A. Trends in Index Numbers for Means of Federally Funded Expenditures for Research in Psychology Shown in TABLE B-6 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year					
		1964	1968	1970	1972	1973	1974
All Private Institutions	54	85.2	105.6	95.0	100.0	102.6	92.6
Research Universities I	22	84.6	92.9	92.4	100.0	102.8	91.3
Research Universities II	13	120.2	195.9	121.6	100.0	106.7	88.2
Other Categories	19	37.5	104.0	81.6	100.0	94.6	113.1
All Public Institutions	89	58.5	109.0	108.2	100.0	102.9	97.5
Research Universities I	26	58.1	113.9	114.2	100.0	103.8	98.9
Research Universities II	27	64.2	107.6	96.0	100.0	102.7	98.0
Other Categories	36	49.3	89.1	103.4	100.0	99.0	90.1

APPENDIX C

ENROLLMENT TABLES FOR INSTITUTIONS CLASSIFIED BY CATEGORIES OF THE CARNEGIE COMMISSION ON HIGHER EDUCATION

TABLE C-1. Trends in Mean Degree-Credit Enrollment by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fall Term of Fiscal Year							
		1965	1966	1969	1970	1971	1972	1973	1974
All Private Institutions	55	9,421	9,840	10,533	10,619	10,997	10,591	10,666	10,653
Research Universities I	22	10,982	11,234	11,787	11,896	12,266	11,205	11,432	11,318
Research Universities II	13	7,732	8,041	8,661	8,062	8,737	8,912	8,891	9,048
Other Categories	20	8,803	9,475	10,370	10,876	11,070	11,008	10,977	10,966
All Public Institutions	92	12,851	14,162	17,320	18,421	19,748	19,831	20,320	20,487
Research Universities I	27	18,661	20,640	24,861	26,059	28,715	28,013	29,184	29,098
Research Universities II	27	12,572	13,931	17,398	18,388	18,879	19,381	19,563	19,903
Other Categories	38	8,920	9,722	11,906	13,016	13,994	14,338	14,560	14,783

[a]Source: National Center for Education Statistics.

TABLE C-1A. Trends in Index Numbers for the Means of Degree-Credit Enrollment Shown in TABLE C-1 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year							
		1965	1966	1969	1970	1971	1972	1973	1974
All Private Institutions	55	89.0	92.9	99.4	100.3	103.8	100.0	100.7	100.6
Research Universities I	22	98.0	100.3	105.2	106.2	109.5	100.0	102.0	101.0
Research Universities II	13	86.8	90.2	97.2	90.5	98.0	100.0	99.8	101.5
Other Categories	20	80.0	86.1	94.2	98.8	100.6	100.0	99.7	99.6
All Public Institutions	92	64.8	71.4	87.3	92.9	99.6	100.0	102.5	103.3
Research Universities I	27	66.6	73.7	88.7	93.0	102.5	100.0	104.2	103.9
Research Universities II	27	64.9	71.9	89.8	94.9	97.4	100.0	100.9	102.7
Other Categories	38	62.2	67.8	83.0	90.8	97.6	100.0	101.6	103.1

TABLE C-2. Trends in Mean Enrollment for Advanced Degrees[a] in All Fields by Carnegie Commission Categories of Institutions

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	50	2,438	2,587	2,701	2,776	2,795	2,772	2,801
Research Universities I	20	3,524	3,734	3,909	3,941	3,862	3,814	3,858
Research Universities II	12	1,732	1,900	2,029	2,162	2,175	2,148	2,118
Other Categories	18	1,703	1,772	1,807	1,892	2,022	2,031	2,082
All Public Institutions	71	2,413	2,742	2,875	3,099	3,274	3,265	3,283
Research Universities I	21	4,559	4,915	5,093	5,377	5,497	5,495	5,467
Research Universities II	22	2,059	2,477	2,607	2,960	3,136	2,964	2,974
Other Categories	28	1,082	1,321	1,422	1,500	1,716	1,829	1,887

[a]Source: National Center for Education Statistics.

TABLE C-2A. Trends in Index Numbers for the Means of Enrollment for Advanced Degrees in All Fields by Carnegie Commission Categories Shown in TABLE C-2 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	50	87.9	93.3	97.4	100.1	100.8	100.0	101.0
Research Universities I	20	92.4	97.9	102.5	103.3	101.2	100.0	101.1
Research Universities II	12	80.7	88.5	94.5	100.6	101.2	100.0	98.6
Other Categories	18	83.8	87.2	89.0	93.1	99.6	100.0	102.5
All Public Institutions	71	73.9	84.0	88.1	94.9	100.3	100.0	100.5
Research Universities I	21	83.0	89.5	92.7	97.9	100.0	100.0	99.5
Research Universities II	22	69.5	83.6	87.9	99.9	105.8	100.0	100.3
Other Categories	28	59.2	72.2	77.7	82.0	93.8	100.0	103.1

TABLE C-3. Trends in Mean Enrollment for Advanced Degrees in Biomedical-Behavioral Sciences by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	49	221	231	234	240	245	267	291
Research Universities I	19	305	316	320	330	332	371	393
Research Universities II	12	225	231	243	246	254	263	293
Other Categories	18	130	141	137	141	146	160	180
All Public Institutions	70	303	328	353	372	382	419	434
Research Universities I	21	594	632	678	719	737	796	828
Research Universities II	21	256	273	282	300	308	340	357
Other Categories	28	119	140	163	164	171	195	196

[a]Source: National Center for Education Statistics.

TABLE C-3A. Trends in Index Numbers for Means of Enrollment for Advanced Degrees in Biomedical-Behavioral Sciences Shown in TABLE C-3 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	49	82.8	86.4	87.6	89.9	91.6	100.0	108.7
Research Universities I	19	82.2	85.1	86.3	89.0	89.6	100.0	106.0
Research Universities II	12	85.4	87.9	92.3	93.4	96.3	100.0	111.4
Other Categories	18	81.4	87.9	85.8	88.2	91.2	100.0	112.5
All Public Institutions	70	72.2	78.2	84.3	88.7	91.2	100.0	103.6
Research Universities I	21	74.6	79.4	85.2	90.4	92.6	100.0	104.1
Research Universities II	21	75.3	80.3	82.9	88.2	90.5	100.0	104.8
Other Categories	28	60.9	71.7	83.5	84.3	87.9	100.0	100.6

TABLE C-4. Trends in Mean Enrollment for Advanced Degrees in Biological Sciences by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	49	117	123	120	122	118	119	125
Research Universities I	19	184	193	196	200	191	189	199
Research Universities II	12	80	87	77	75	73	71	77
Other Categories	18	72	73	68	72	71	75	80
All Public Institutions	70	179	190	199	206	212	215	215
Research Universities I	21	334	356	361	376	381	392	400
Research Universities II	21	159	161	181	185	186	187	184
Other Categories	28	78	89	93	97	107	104	100

[a]Source: National Center for Education Statistics.

TABLE C-4A. Trends in Index Numbers for the Means of Enrollment for Advanced Degrees in Biological Sciences Shown in TABLE C-4 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	49	99.0	103.5	101.3	103.3	99.3	100.0	105.8
Research Universities I	19	97.1	101.7	103.7	105.4	100.6	100.0	105.2
Research Universities II	12	112.3	121.9	107.9	105.4	102.1	100.0	107.6
Other Categories	18	95.8	96.8	90.7	96.2	94.4	100.0	106.2
All Public Institutions	71	83.3	88.5	92.9	96.2	98.9	100.0	100.1
Research Universities I	21	85.4	90.8	92.2	96.0	97.2	100.0	102.2
Research Universities II	22	85.3	86.0	97.2	98.8	99.8	100.0	98.8
Other Categories	28	74.5	85.3	88.8	92.9	102.3	100.0	96.1

TABLE C-5. Trends in Mean Enrollment for Advanced Degrees in Health Professions by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	49	41	43	48	50	57	80	89
Research Universities I	19	41	46	46	52	61	101	109
Research Universities II	12	73	70	90	92	101	110	124
Other Categories	18	19	21	23	21	22	37	45
All Public Institutions	71	46	50	56	65	71	103	113
Research Universities I	21	128	139	159	182	200	251	264
Research Universities II	21	22	24	25	29	33	60	76
Other Categories	28	1	2	2	3	4	25	28

[a]Source: National Center for Education Statistics.

TABLE C-5A. Trends in Index Numbers for the Means of Enrollment for Advanced Degrees in Health Professions Shown in TABLE C-5 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	49	51.2	53.5	60.7	62.9	70.8	100.0	112.0
Research Universities I	19	40.5	45.6	45.5	50.9	60.3	100.0	107.8
Research Universities II	12	66.3	63.8	81.8	83.5	91.6	100.0	112.9
Other Categories	18	51.9	55.9	62.6	56.7	60.0	100.0	122.7
All Public Institutions	71	44.2	48.1	54.3	62.8	69.2	100.0	110.0
Research Universities I	21	51.1	55.5	63.5	72.8	79.7	100.0	105.4
Research Universities II	22	36.8	39.7	41.8	48.8	54.7	100.0	127.8
Other Categories	28	5.2	7.3	6.6	12.4	16.3	100.0	112.7

TABLE C-6. Trends in Mean Enrollment for Advanced Degrees in Psychology by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	49	63	65	66	68	70	69	76
Research Universities I	19	80	77	78	79	81	80	85
Research Universities II	12	72	74	76	79	80	82	92
Other Categories	18	39	47	46	48	53	48	55
All Public Institutions	71	79	88	100	103	100	103	108
Research Universities I	21	131	137	158	161	157	153	164
Research Universities II	21	79	89	84	95	97	102	104
Other Categories	28	40	49	69	65	61	66	68

[a]Source: National Center for Education Statistics.

TABLE C-6A. Trends in Index Numbers for the Means of Enrollment for Advanced Degrees in Psychology Shown in TABLE C-6 (Means for FY 1972 = 100)

Type of Institution	Number	Fall Term of Fiscal Year						
		1967	1968	1969	1970	1971	1972	1973
All Private Institutions	49	91.5	94.9	95.4	98.1	102.2	100.0	109.9
Research Universities I	19	99.7	95.6	96.7	98.2	100.7	100.0	105.5
Research Universities II	12	87.5	90.4	92.9	96.3	97.6	100.0	112.6
Other Categories	18	81.6	98.6	96.0	99.9	110.2	100.0	114.5
All Public Institutions	71	76.7	85.0	96.9	99.6	97.3	100.0	104.5
Research Universities I	12	85.6	89.4	102.9	105.1	102.1	100.0	106.8
Research Universities II	22	77.4	87.3	82.5	93.4	94.7	100.0	102.5
Other Categories	28	60.3	74.4	104.0	97.6	92.0	100.0	103.1

A P P E N D I X D

TABLES SHOWING EARNED DOCTORAL DEGREES FOR INSTITUTIONS CLASSIFIED BY CATEGORIES OF THE CARNEGIE COMMISSION ON HIGHER EDUCATION

TABLE D-1. Trends in Mean Number of Earned Doctoral Degrees in All Fields by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	75	82	127	145	157	173	189	199	200	207	200
Research Universities I	20	130	138	214	242	259	282	299	314	321	328	314
Research Universities II	11	41	50	79	92	105	120	143	146	136	146	140
Other Categories	14	21	28	40	49	53	59	67	76	76	81	83
All Public Institutions	57	60	70	119	138	153	177	202	215	221	226	219
Research Universities I	19	122	144	228	262	281	319	363	379	381	384	370
Research Universities II	20	43	51	96	112	126	146	165	180	190	198	190
Other Categories	18	13	15	29	36	47	61	72	81	87	91	93

[a]Source: National Center for Education Statistics.

TABLE D-1A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in All Fields Shown in TABLE D-1 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	37.3	41.1	63.6	72.8	78.7	86.6	94.7	99.5	100.0	103.5	100.0
Research Universities I	20	40.6	42.9	66.6	75.2	80.5	87.8	93.0	97.6	100.0	102.0	97.8
Research Universities II	11	30.0	36.6	58.1	68.2	77.5	88.2	105.8	107.5	100.0	107.5	103.0
Other Categories	14	28.1	36.3	52.8	64.9	69.6	77.2	88.7	99.9	100.0	107.0	109.3
All Public Institutions	57	27.1	31.9	53.8	62.5	69.1	80.1	91.3	97.4	100.0	102.3	99.2
Research Universities I	19	32.1	37.8	60.0	68.7	73.7	83.8	95.4	99.5	100.0	100.8	97.2
Research Universities II	20	22.8	26.8	50.6	59.3	66.6	76.9	87.1	95.0	100.0	104.4	100.1
Other Categories	18	14.4	17.2	33.2	41.5	53.4	70.5	82.6	93.4	100.0	104.1	106.6

TABLE D-2. Trends in Mean Number of Earned Doctoral Degrees in Biomedical-Behavioral Sciences by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	17	17	18	22	24	25	27	29	29	30	31
Research Universities I	20	28	26	30	34	37	39	41	45	45	47	48
Research Universities II	11	12	15	14	17	21	22	25	26	22	24	22
Other Categories	14	4	5	5	8	7	8	8	10	11	11	13
All Public Institutions	57	20	22	25	28	31	38	40	43	43	43	42
Research Universities I	19	40	45	49	50	56	63	70	74	75	73	70
Research Universities II	20	14	15	18	23	25	33	32	35	33	34	37
Other Categories	18	5	6	6	9	12	15	16	19	19	21	20

[a]Source: National Center for Education Statistics.

TABLE D-2A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in Biomedical-Behavioral Sciences Shown in TABLE D-2 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	57.9	58.8	63.3	76.0	82.4	87.4	92.9	101.7	100.0	105.2	107.2
Research Universities I	20	61.6	58.4	66.8	75.6	82.5	87.1	90.7	100.1	100.0	104.7	106.4
Research Universities II	11	56.7	69.6	63.8	79.2	96.7	100.8	115.8	117.9	100.0	110.4	102.5
Other Categories	14	39.0	45.3	42.8	73.6	60.4	68.6	71.1	86.2	100.0	100.0	118.2
All Public Institutions	57	46.0	52.2	58.1	64.4	72.5	88.1	92.8	100.5	100.0	100.2	99.3
Research Universities I	19	52.6	60.0	65.6	66.8	74.0	84.4	93.1	98.3	100.0	97.6	93.1
Research Universities II	20	43.1	46.9	54.9	68.9	75.0	100.6	96.8	106.1	100.0	102.0	111.1
Other Categories	18	24.1	30.1	33.5	46.1	61.3	79.4	83.7	99.1	100.0	107.7	102.0

TABLE D-3. Trends in Mean Number of Earned Doctoral Degrees in Biological Sciences by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	9	10	10	12	15	15	16	18	18	17	17
Research Universities I	20	16	16	17	20	25	24	26	29	29	28	28
Research Universities II	11	7	7	7	8	12	10	12	13	11	11	9
Other Categories	14	2	3	3	3	4	5	5	6	7	6	8
All Public Institutions	57	12	15	16	18	21	25	26	28	28	28	26
Research Universities I	19	25	31	32	33	39	44	47	50	51	49	45
Research Universities II	20	10	11	12	14	16	22	22	23	22	22	21
Other Categories	18	3	4	4	5	7	9	9	12	11	12	11

[a]Source: National Center for Education Statistics.

TABLE D-3A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in Biological Sciences Shown in TABLE D-3 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	52.7	55.6	56.6	67.5	85.4	81.9	91.1	102.1	100.0	96.6	96.5
Research Universities I	20	53.6	55.5	57.6	70.5	85.3	81.6	90.3	100.2	100.0	97.8	96.4
Research Universities II	11	67.5	70.1	65.8	73.5	112.8	96.6	112.8	125.6	100.0	101.7	87.2
Other Categories	14	30.0	39.0	40.0	43.0	54.0	67.0	70.0	86.0	100.0	84.0	108.0
All Public Institutions	57	44.1	54.3	58.0	63.0	74.8	89.8	93.4	100.3	100.0	98.9	91.6
Research Universities I	19	48.3	60.4	63.0	65.4	77.2	87.4	91.5	97.3	100.0	96.4	88.7
Research Universities II	20	44.1	50.1	57.8	65.9	75.2	100.0	103.2	106.7	100.0	100.7	95.6
Other Categories	18	24.4	34.1	34.6	45.9	62.4	79.5	82.0	101.0	100.0	107.3	96.6

TABLE D-4. Trends in Mean Number of Earned Doctoral Degrees in Health Professions by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	0	1	1	1	1	1	1	2	1	1	2
Research Universities I	20	0	1	1	1	1	1	1	2	2	2	3
Research Universities II	11	0	1	0	1	0	2	2	2	1	1	1
Other Categories	14	0	0	0	0	0	0	0	1	0	1	0
All Public Institutions	57	2	2	2	2	2	2	2	3	3	3	3
Research Universities I	19	3	4	5	4	4	4	6	6	6	6	6
Research Universities II	20	1	1	1	2	1	1	1	2	2	1	3
Other Categories	18	0	0	0	0	0	0	0	1	0	0	0

[a]Source: National Center for Education Statistics.

TABLE D-4A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in Health Professions Shown in TABLE D-4 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	23.6	41.8	41.8	61.8	50.9	65.5	89.1	134.5	100.0	101.8	147.3
Research Universities I	20	27.8	38.9	50.0	66.7	66.7	52.8	69.4	105.6	100.0	100.0	180.6
Research Universities II	11	18.8	56.3	31.3	50.0	25.0	106.3	143.7	156.2	100.0	75.0	75.0
Other Categories	14	0.0	0.0	0.0	66.7	0.0	0.0	33.3	366.7	100.0	266.7	133.3
All Public Institutions	57	51.5	51.5	73.7	72.5	58.7	68.3	85.0	99.4	100.0	90.4	107.8
Research Universities I	19	59.3	64.8	88.9	77.8	76.9	78.7	102.8	108.3	100.0	112.0	97.2
Research Universities II	20	44.0	28.0	52.0	74.0	28.0	50.0	54.0	78.0	100.0	42.0	136.0
Other Categories	18	0.0	22.2	11.1	0.0	11.1	44.4	44.4	111.1	100.0	100.0	77.8

TABLE D-5. Trends in Mean Number of Earned Doctoral Degrees in Psychology by Carnegie Commission Categories of Institutions[a]

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	7	7	8	9	8	10	10	10	10	12	12
Research Universities I	20	12	10	12	12	11	15	13	14	14	17	17
Research Universities II	11	5	7	6	9	9	10	11	10	10	12	12
Other Categories	14	2	2	2	5	3	3	3	3	4	5	5
All Public Institutions	57	6	6	6	8	8	10	11	12	12	12	14
Research Universities I	19	12	11	12	13	12	15	18	18	19	18	19
Research Universities II	20	4	4	4	7	8	10	8	10	9	11	13
Other Categories	18	2	2	2	4	5	6	7	7	8	8	8

[a]Source: National Center for Education Statistics.

TABLE D-5A. Trends in Index Numbers for the Means of Earned Doctoral Degrees in Psychology Shown in TABLE D-5 (Means for FY 1972 = 100)

Type of Institution	Number	Fiscal Year										
		1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
All Private Institutions	45	71.4	66.7	77.9	92.9	80.8	99.8	96.7	96.9	100.0	120.8	121.2
Research Universities I	20	82.1	66.7	87.7	87.0	78.6	102.8	94.0	99.3	100.0	119.3	117.5
Research Universities II	11	50.5	71.0	66.4	89.7	89.7	104.7	115.0	103.7	100.0	125.2	123.4
Other Categories	14	57.1	58.9	50.0	128.6	75.0	75.0	75.0	71.4	100.0	119.6	135.7
All Public Institutions	57	49.0	47.2	54.7	65.7	70.3	88.9	93.1	101.3	100.0	105.8	115.6
Research Universities I	19	62.4	57.3	65.8	67.2	64.4	78.0	94.6	98.0	100.0	96.6	104.0
Research Universities II	20	40.4	44.4	48.9	74.7	87.6	116.3	93.3	112.4	100.0	121.9	141.6
Other Categories	18	25.2	24.4	33.3	49.6	63.0	81.5	88.9	95.6	100.0	108.9	111.9

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