

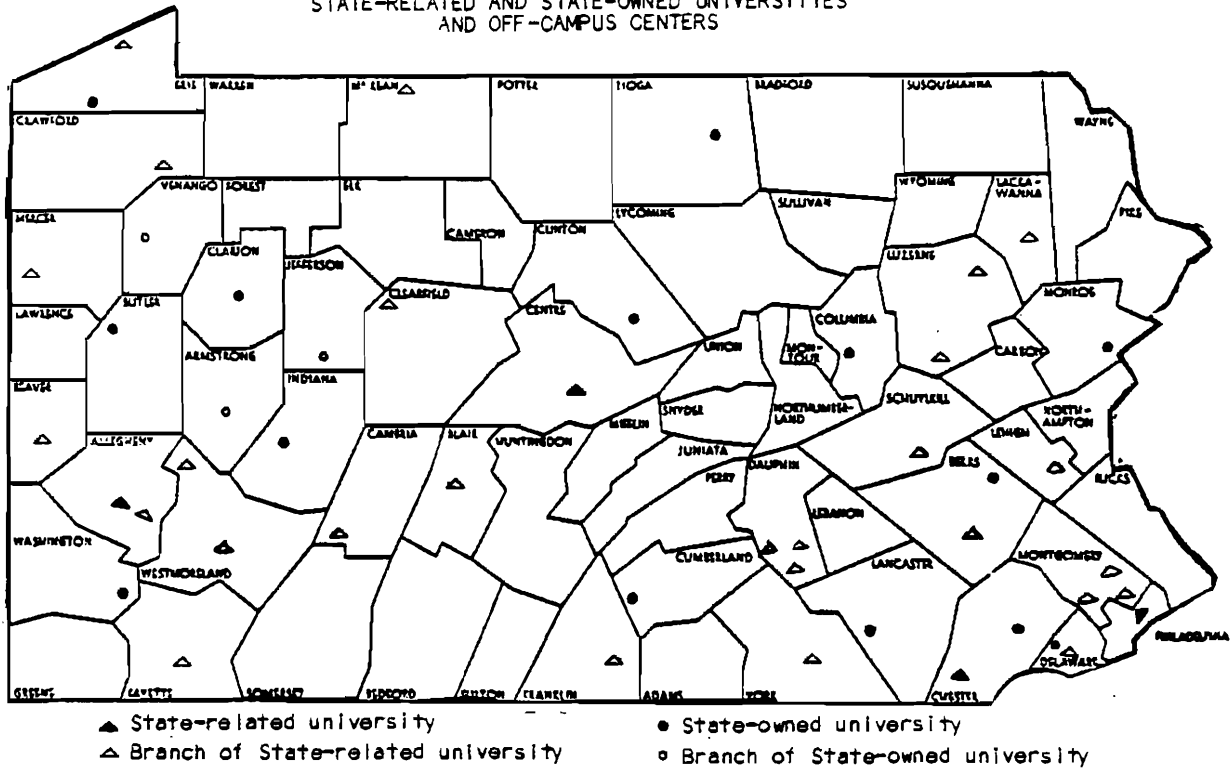
# INSTRUCTIONAL OUTPUT AND FACULTY SALARY COSTS OF THE STATE-RELATED AND STATE-OWNED UNIVERSITIES

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Analysis of 1984-85 Data  
Reported Under 1984 Appropriations Acts  
and Public School Code

Staff Report  
General Assembly of the Commonwealth of Pennsylvania  
JOINT STATE GOVERNMENT COMMISSION  
108 Finance Building  
Harrisburg, Pennsylvania  
February 1986

STATE-RELATED AND STATE-OWNED UNIVERSITIES  
AND OFF-CAMPUS CENTERS



State-Related Universities

Penn State (Centre)

- Allentown Campus (Lehigh)
- Altoona Campus (Blair)
- Beaver Campus (Beaver)
- Behrend College (Erie)
- Berks Campus (Berks)
- Capitol Campus (Dauphin)
- Delaware Campus (Delaware)
- DuBois Campus (Clearfield)
- Fayette Campus (Fayette)
- Hazleton Campus (Luzerne)
- Hershey Medical Center (Dauphin)
- King of Prussia Center for Graduate Studies (Montgomery)
- McKeesport Campus (Allegheny)
- Mont Alto (Franklin)
- New Kensington (Westmoreland)
- Ogontz Campus (Montgomery)
- Schuylkill Campus (Schuylkill)

Penn State (Centre) (cont.)

- Shenango Valley Campus (Mercer)
- University Center at Harrisburg (Dauphin)
- Wilkes-Barre Campus (Luzerne)
- Worthington Scranton Campus (Lackawanna)
- York Campus (York)
- Pittsburgh (Allegheny)
- Bradford Campus (McKean)
- Greensburg Campus (Westmoreland)
- Johnstown Campus (Cambria)
- Titusville Campus (Crawford)
- Temple (Philadelphia)
- Ambler Campus (Montgomery)
- University Center at Harrisburg (Dauphin)
- Lincoln (Chester)

State-Owned Universities

- Bloomsburg (Columbia)
- California (Washington)
- Cheyney (Delaware)
- Clarion (Clarion)
- Venango Campus (Venango)
- East Stroudsburg (Monroe)
- Edinboro (Erie)
- Indiana (Indiana)
- Armstrong Campus (Armstrong)
- Punxsutawney Campus (Jefferson)
- Kutztown (Berks)
- Lock Haven (Clinton)
- Mansfield (Tioga)
- Millersville (Lancaster)
- Shippensburg (Cumberland)
- Slippery Rock (Butler)
- West Chester (Chester)

## Foreword

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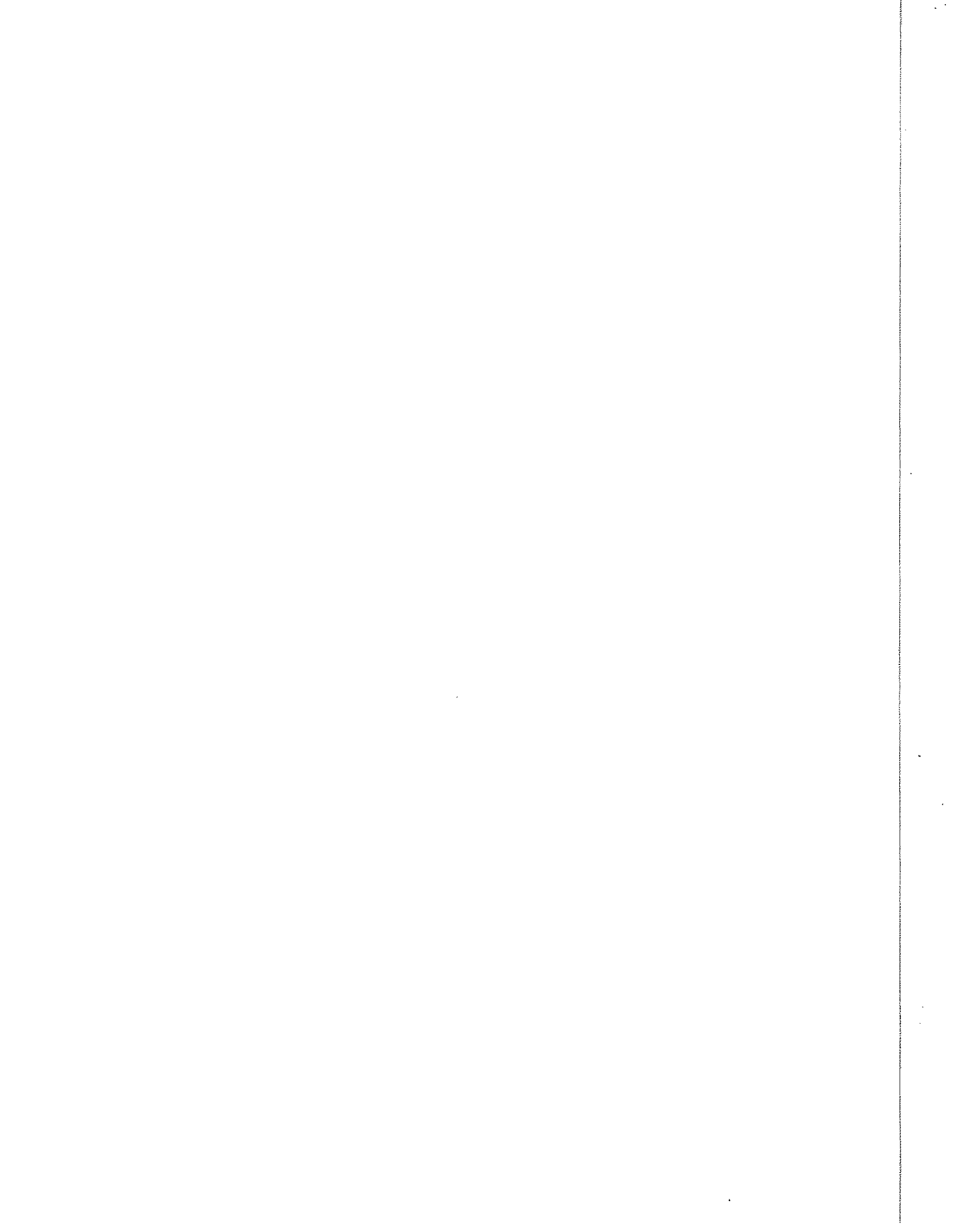
This 13th annual report contains an analysis of the instructional output and faculty salary costs reported by Pennsylvania's State-related and State-owned universities--the Commonwealth's public universities--for 1984-85.

Current-year output, salary, tuition and appropriations data are summarized and significant year-to-year changes noted. Output and salary data are combined to form a measure of cost efficiency--the salary cost per unit of instructional output. Tuition and appropriations data are combined to form a measure of cost sharing--the division of instructional cost between students and taxpayers.

Prior years' data are utilized to reveal underlying trends in output, salary, cost efficiency and cost sharing during the past several years.

Finally, data from other sectors of higher education in Pennsylvania, and for the nation as a whole, are introduced to place the data and analysis for the public universities into perspective.

DONALD C. STEELE  
Research Director  
Joint State Government Commission



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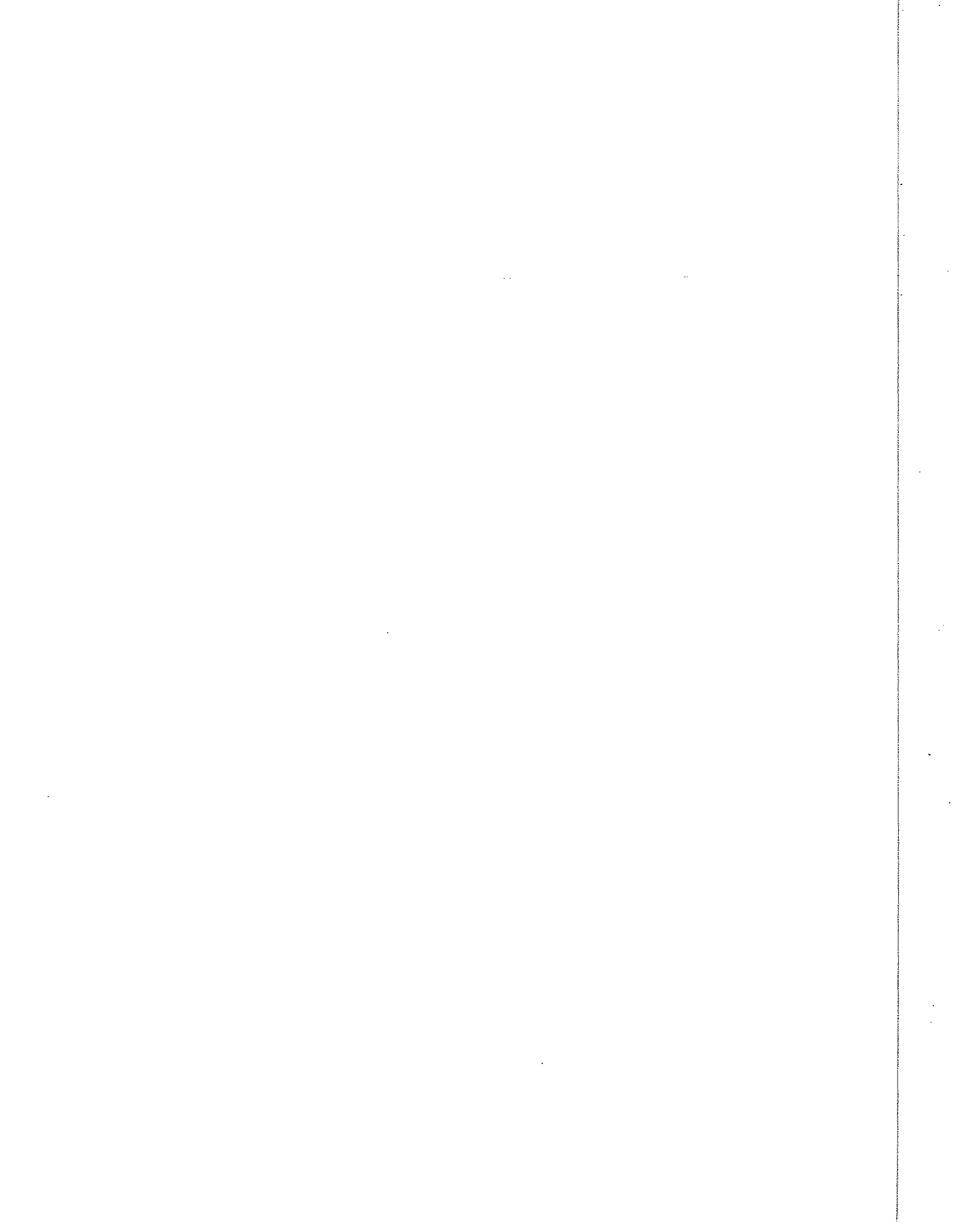
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## Summary

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1. In Fall 1984 approximately 39 percent of the total full- and part-time students enrolled in institutions of higher education in Pennsylvania were enrolled in the Commonwealth's public universities: 126,536 in the 4 State-related institutions and 82,513 in the 14 State-owned institutions. During 1984-85, full-time equivalent (FTE) student enrollment (based on student credit hours produced) totaled 111,777 and 78,552, respectively, in the two groups of public universities. In the aggregate, FTE enrollment in the State-related universities decreased by less than 1 percent, and in the State-owned universities increased by less than 1 percent, over 1983-84.
2. During 1984-85 about one-half of the total undergraduate and graduate degrees (not including associate degrees and medical degrees) conferred by all institutions of higher education in Pennsylvania were conferred by the public universities: 21,070 by the State-related institutions and 14,091 by the State-owned institutions. Total degrees conferred by the State-related group increased by about 2 percent, and by the State-owned group decreased by 1 percent, from the previous year. In the State-related group, a decrease in graduate degrees was more than offset by an increase in undergraduate degrees; in the State-owned group, most of the decrease was accounted for by a decrease in undergraduate degrees.
3. Between 1980-81 and 1984-85, FTE student enrollment increased by small amounts at Pittsburgh and Lincoln, decreased by about 11 percent at Temple, and increased by a total of nearly 5 percent at the State-owned universities; data reporting changes preclude making five-year comparisons for Penn State.
4. During academic year 1984-85 approximately 44 percent of the total full-time ranked instructional faculty employed by all institutions of higher education in Pennsylvania were employed

by the public universities: 5,187 by the State-related universities and 4,154 by the State-owned universities. Total full-time faculty increased by 1 percent at the State-related and 2 percent at the State-owned schools over the previous year. The overall average reported faculty workweek was 53.2 hours, virtually unchanged from Fall 1983. Total hours spent by this faculty in classroom contact with students averaged 9.3 at the more research-oriented State-related institutions, and 11.8 at the State-owned institutions.

5. During 1984-85 the full-time equivalent (FTE) instructional faculty employed by the State-related universities totaled 6,599, and by the State-owned universities 4,297. For this faculty, the overall average salary was \$26,200 at the State-related institutions, and \$29,100 at the State-owned institutions. These average salaries represent increases of 5 percent and 4 percent for the two faculty groups, respectively, over 1983-84. The average salary at the State-owned universities is higher, in part, because these institutions utilize a larger proportion of faculty in the top faculty ranks. Rank distributions are related to the sizes and nature of the various institutions: the larger State-related universities tend to make more use of lecturers and teaching assistants than do the State-owned universities.
6. For academic year 1984-85, the overall average salary for full-time ranked instructional faculty at public institutions of higher education in the U.S. was \$31,200; for private institutions the overall average salary was \$30,500. The comparable average salaries for the State-related and State-owned universities were \$31,600 and \$31,000, respectively. Relative differences in the rank distributions of the faculty also explain much of the relative differences in the average salaries in these comparisons.
7. Between 1980-81 and 1984-85, the total FTE instructional faculty changed by only small amounts at Pittsburgh and Lincoln, decreased by about 11 percent at Temple, and increased by approximately 3 percent at the State-owned universities. During this time, the ratios of FTE students to FTE instructional faculty increased at Pittsburgh and the State-owned universities, decreased at Lincoln, and remained virtually unchanged at Temple. Between 1980-81 and 1984-85, the average instructional salary of the FTE instructional faculty increased at the various institutions as follows: Pittsburgh \$6,000 (29 percent), Temple \$4,900 (23 percent),

total State-owned universities \$4,300 (17 percent), and Lincoln \$2,000 (12 percent). The more rapid increase in the average instructional salary at the State-related universities during recent years has narrowed the gap between the average salary at the two groups of universities.

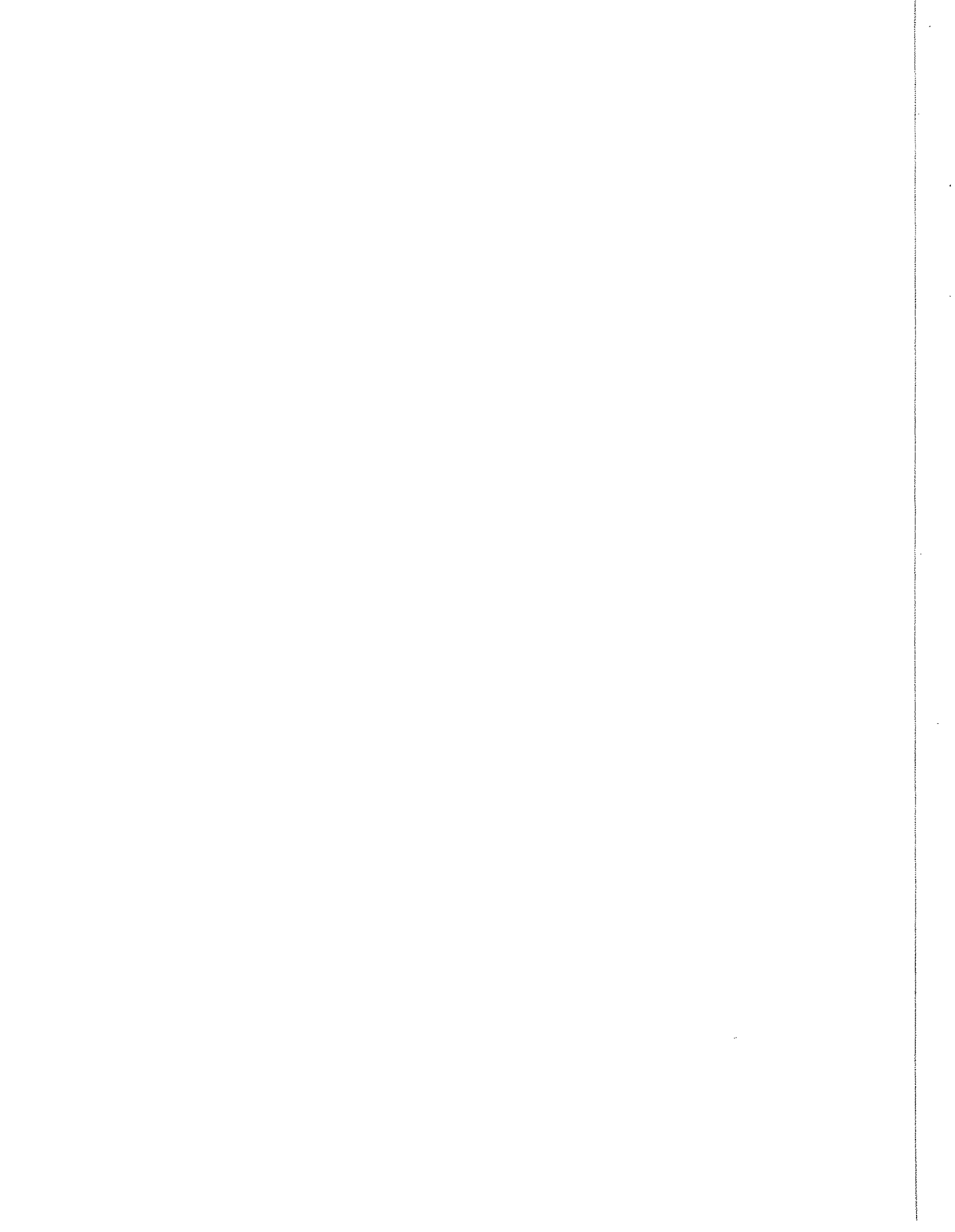
8. During 1984-85 the average instructional faculty salary cost per student credit hour (SCH cost) averaged \$39 for undergraduate students and \$112 for master's students at the State-related universities; these costs represent increases of \$2 (5 percent) and \$11 (11 percent) for the two academic levels, respectively, over 1983-84. SCH cost averaged \$51 for undergraduates and \$113 for master's students at the State-owned universities--increases of \$3 (6 percent) and \$2 (2 percent), respectively, over the previous year. SCH cost tends to vary inversely with the size (or scale) of output, and directly with academic levels, in individual institutions. SCH cost also varies considerably by program area.
9. SCH cost is determined mainly by average salary and average class (section) size, as measured in each academic level and program area. Statistical estimates indicate that undergraduate SCH cost could be expected to increase by approximately .97 percent for each 1 percent increase in average salary at the larger State-related universities, and by about .92 to 1.16 percent for each 1 percent increase in average salary at the smaller State-owned universities, depending upon academic level. For each increase in average class size by 1 percent, SCH cost can be expected to decrease by about .67 to .84 percent, depending upon type of institution and academic level.
10. Statistical analysis shows that instructional costs per student in public higher education institutions throughout the nation are positively related to average faculty salaries and governmental appropriations and negatively related to average enrollment per institution. When compared to other states, Pennsylvania's relatively high per student cost--in fiscal year 1983, \$5,303, the sixth highest in the nation--would appear to be mainly due to a higher-than-average faculty salary and a lower-than-average FTE student enrollment per campus.
11. During 1984-85, main campus tuition and required fees for full-time in-State undergraduate students averaged \$2,523 at the State-related universities and \$1,741 at the State-owned

universities, representing average increases of 6.5 and 5.8 percent over 1983-84, respectively. Average student charges for full-time in-State graduate students were higher than those for undergraduates in both groups of institutions, as were student charges for out-of-state students for all academic levels.

12. During fiscal year 1985, the General Fund appropriation to the public universities totaled approximately \$543 million: the State-related institutions received \$295 million, and the State-owned institutions \$248 million. The direct appropriations represented increases of 8 percent for both types of universities over the previous fiscal year. The direct appropriation per FTE student averaged \$2,640 at the State-related institutions, and \$3,160 at the State-owned institutions; appropriations per FTE student to individual institutions tended to vary inversely with institution size. Direct appropriations averaged 45 percent of total revenues from student charges and appropriations at the State-related universities, and 66 percent at the State-owned universities.
  
13. The fiscal year 1985 appropriation from the General Fund to the Pennsylvania Higher Education Assistance Agency (PHEAA) totaled \$110 million. Of this total, approximately \$33 million, or 30 percent, was used by PHEAA for various financial-aid programs for students enrolled in the public universities. Nearly \$21 million was awarded to about 26,000 undergraduates at the State-related universities, and over \$11 million to nearly 21,000 undergraduates at the State-owned universities, under the State Higher Education Grant Program. Over \$607,000 went to students at the State-related institutions, and over \$1 million to students at the State-owned institutions, under the State Matching Fund Program. In addition, PHEAA administered low-interest guaranteed loans by private lenders to over 84,000 students at the public universities under various loan guarantee programs.
  
14. Between 1979-80 and 1984-85, average tuition and fees per FTE student increased by 16.1 percent per year at the State-related universities, and 12.1 percent per year at the State-owned universities. During the same time, the average Commonwealth appropriation per FTE student increased by 6 percent and 4 percent per year, respectively, at the two groups of institutions. Therefore, student shares of instructional cost increased at both types of institutions. These increasing

student shares were accompanied by PHEAA grants which increased slightly as percentages of total per student charges.

15. During fiscal year 1985, the average student tuition at a public institution of higher education in Pennsylvania (including two-year institutions, medical schools and research institutions) was \$2,009, nearly double the U.S. average. Total State and local appropriations per FTE student were \$3,287, slightly less than the U.S. average. Thus the student share of public higher education in the Commonwealth was significantly higher than the national average. At least part of this higher student share can be viewed as the price that is paid for the convenience and economy to students of the availability of many geographically diverse public campuses in Pennsylvania.



## I. Introduction

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In Pennsylvania, post-secondary education is provided by a variety of public and private institutions, including State-related universities, State-owned universities, community colleges, private independent institutions, and private State-aided institutions. These institutions, which offer students a wide range of choice with regard to size, location, programs, degrees, and student charges, afford considerable diversity in meeting the higher education needs of the Commonwealth's citizens.

In Fall 1984 some 209,000 students were enrolled in Pennsylvania's public universities: 4 State-related and 14 State-owned institutions. This combined enrollment represented about 39 percent of the total head-count enrollment in all institutions of higher education in the Commonwealth. During 1984-85 the public universities collected over \$485 million in tuition and fees from students. During fiscal year 1985 the Commonwealth appropriated \$543 million directly to these universities for educational and general purposes, and over \$33 million to the Pennsylvania Higher Education Assistance Agency for grants to public university students, and for matching funds and allocations to the public universities.

Clearly, these magnitudes indicate that a large proportion of Pennsylvania students and all Pennsylvania taxpayers ought to be concerned that the Commonwealth's public universities are producing the highest quality education in the most cost-effective manner.

This report addresses the important issue of cost efficiency in Pennsylvania's public universities. Using instructional output, instructional faculty salary, and other data reported by the individual State-related institutions, as required by their appropriation acts, and by the individual State-owned institutions, as mandated by the School Code, the report summarizes and analyzes output and salary by type of public university, academic level and program area. Output and salary data are used to compute a measure of cost efficiency: instructional faculty salary cost per student credit hour produced. Tuition and appropriation data are used to

analyze the issue of cost sharing: the division of the cost of instruction between students at the public universities and taxpayers in the Commonwealth. Finally, data from other sources for other sectors of higher education in Pennsylvania and for other institutions throughout the nation are introduced for comparison purposes. The report does not address the critically important issue of the quality of education in the public universities. This highly complex and controversial issue is beyond the scope of the report.

This report is intended for use by legislators in the appropriation process, by university administrators in policy matters, and by all other interested persons in making informed judgments about the cost effectiveness of public higher education in Pennsylvania.



## II. Instructional Output

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Three separate measures of the instructional output of Pennsylvania's public universities are summarized and analyzed below: full-time equivalent (FTE) students, student credit hours, and degrees. FTE students, derived from student credit hours earned, account for differences in the mix of full- and part-time students and are useful for making meaningful comparisons of output, both between diverse institutions and within individual institutions over time. Student credit hours are most useful for making instructional cost comparisons for the different academic levels and program areas. Degrees by major fields are an important indicator of student interests and career objectives.

### FULL-TIME EQUIVALENT (FTE) STUDENTS

In Fall 1984, 209,049 full- and part-time students were enrolled in the Commonwealth's public universities: 126,536 (61 percent) in the State-related universities, and 82,513 (39 percent) in the State-owned universities. The total head-count enrollment in the public universities represents approximately 39 percent of the total students enrolled in the 225 public and private institutions of higher education in Pennsylvania.<sup>1</sup>

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<sup>1</sup>Pennsylvania Department of Education, Higher Education Summer and Fall Enrollments, 1984.

During the 1984-85 school year,<sup>2</sup> total student credit-hour production by the public universities was the equivalent of 190,329 full-time students: 111,777 (59 percent) by the State-related institutions, and 78,552 (41 percent) by the State-owned institutions (table 1).<sup>3</sup>

Table 1 shows that total FTE students increased by 3 percent at Temple, decreased by 2 percent at Penn State and 6 percent at Lincoln, and were virtually unchanged at Pittsburgh over the previous year. In the aggregate, total FTE enrollment in the State-owned universities changed little from 1983-84.

The relationship between head-count students and FTE students depends upon the mix of full- and part-time students at the individual institutions. In turn, this mix depends upon several factors, including levels and types of programs, and urban or rural campus settings. At Pittsburgh and Temple, about three-quarters of the FTE students were undergraduates; both universities have large first professional and graduate programs. At Penn State, Lincoln and the State-owned institutions, about 90 percent of the FTE students were undergraduates. These varying mixes of students by level, plus the geographic locations of the institutions, were associated with a wide variance in the ratios of full-time to total students: Penn State main campus 89.3, branches 66.9; Pittsburgh main campus 61.1, branches 71.8; Temple 63.8; Lincoln 98.5; and the State-owned universities 80.3.<sup>4</sup>

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<sup>2</sup>Unless otherwise noted, all data in this report apply to the indicated school year, which includes the summer term preceding the academic year plus the fall and spring terms of the academic year; e.g., the 1984-85 school year includes the summer and fall terms of 1984 plus the spring term of 1985. Care should be exercised when comparing these data and the computations derived from them to numbers from other sources, which may cover different time periods.

<sup>3</sup>FTE students are computed by dividing total undergraduate student credit hours by 30 and total graduate student credit hours by 24, the standard academic-year workloads for full-time students at the respective academic levels.

<sup>4</sup>Higher Education Summer and Fall Enrollments, 1984.

Table 1

FULL-TIME EQUIVALENT STUDENTS BY LEVEL<sup>1</sup>  
1984-85, CHANGE FROM 1983-84 AND FIVE-YEAR AVERAGE ANNUAL RATE OF CHANGE (1979-80 to 1984-85)

Institution <sup>2</sup>	Total				Undergraduate level				Graduate level <sup>3</sup>			
	FTE students	One-year change	Percentage change		FTE students	One-year change	Percentage change		FTE students	One-year change	Percentage change	
			One year	Five-year average			One year	Five-year average			One year	Five-year average
State-related												
Penn State	57,280	-1,089	-2%	a	52,376	-1,070	-2%	a	4,904	-19	b	a
Pittsburgh	29,269	-60	b	1%	21,458	89	b	2%	7,811	-149	-2%	-1%
Temple	23,995	707	3	-2	18,139	923	5	b	5,856	-216	-4	-6
Lincoln	1,233	-81	-6	-3	1,094	-19	-2	-2	139	-62	-31	-6
Total	111,777	-523	b	a	93,067	-77	b	a	18,710	-446	-2	a
State-owned												
Indiana <sup>4</sup>	12,880	-80	-1	1	12,092	-24	b	1	788	-56	-7	-1
West Chester	8,250	-143	-2	b	7,573	-211	-3	b	677	68	11	-2
Millersville	6,176	-87	-1	2	5,694	-97	-2	3	482	10	2	-5
Bloomsburg	6,170	-21	b	-1	5,854	-27	b	b	316	6	2	-7
Slippery Rock	6,165	233	4	2	5,868	194	3	3	297	39	15	-3
Edinboro	5,743	38	1	1	5,413	63	1	2	330	-25	-7	-4
Clarion	5,726	91	2	2	5,424	27	1	1	302	64	27	9
Shippensburg	5,626	122	2	b	5,111	117	2	1	515	5	1	-2
Kutztown	5,605	83	2	5	5,376	78	1	5	229	5	2	-4
California	4,716	86	2	3	4,352	50	1	3	364	36	11	1
East Stroudsburg	4,267	79	2	1	3,929	76	2	1	338	3	1	1
Mansfield	2,808	77	3	2	2,663	33	1	2	145	44	43	-2
Lock Haven	2,660	75	3	2	2,660	75	3	2	na	na	na	na
Cheyney	1,760	-236	-12	-5	1,682	-241	-13	-5	78	5	7	-2
Total	78,552	317	b	1	73,691	113	b	1	4,861	204	4	-2
All Institutions	190,329	-206	b	a	166,758	36	b	a	23,571	-242	-1	a

1. Data for each year represent the summer term preceding the academic year plus the academic year. Full-time equivalent students are calculated by dividing undergraduate student credit hours by 30 and graduate student credit hours by 24.

2. Arranged in descending order with respect to total full-time equivalent students for 1984-85.

3. In addition to the master's level, the graduate level for Penn State, Pittsburgh, Temple and Indiana University includes first professional (excluding medical) and/or doctor's levels.

4. Indiana student credit-hour data for fiscal year 1979-80 from "State College and University Budgeting System Common Cost Accounting Reports."

a. In 1983-84, Penn State's data on FTE students were affected by two major reporting changes: a change in the university's academic calendar (to two semesters from three terms in the academic year, and to a shorter summer term); and improved data collection procedures, which permitted the first-time inclusion of activities related to the university's continuing education credit program. Since then Penn State's data are comparable to current year data from the other institutions, but are noncomparable to prior years' data from Penn State and the other institutions.

b. Rounds to less than 1 percent.

na. Not applicable.

SOURCE: Reports provided by the individual institutions, 1980 to 1985.

## STUDENT CREDIT HOURS

### Production by Academic Level

During the 1984-85 school year, the State-related universities produced nearly 3.2 million student credit hours (SCH), and the State-owned universities slightly over 2.3 million SCH.<sup>5</sup>

Table 2 shows that from 1983-84 to 1984-85, changes in the mix of SCH between academic levels varied considerably between individual institutions. In total, SCH production at the State-related institutions increased by 1 percent at the undergraduate lower division, and decreased by 1 percent, 3 percent and 2 percent, respectively, at the undergraduate upper division, master's, and first professional and doctoral levels. In total, SCH production at the State-owned institutions increased by 4 percent at the master's level, but remained nearly unchanged at the other academic levels.

### Production by Program Area

Student credit hour production by broad program areas also varies widely among individual institutions. One widely used taxonomy of program areas is the Classification of Instructional Programs (CIP) taxonomy (table 3).<sup>6</sup> Table 3 shows that the State-related and State-owned universities as groups both produced large proportions of undergraduate SCH in the areas of business, letters, and the social sciences--areas related both to general distribution requirements and student majors. In addition, the State-owned group produced a large proportion of undergraduate SCH in education. At the State-related institutions, the largest proportions of graduate SCH were produced in the areas of business, education, health and law.

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<sup>5</sup>Student credit hours are measured at the conclusion of drop/add periods.

<sup>6</sup>The CIP taxonomy, introduced by the National Center for Education Statistics in 1981, replaces the HEGIS taxonomy. This report utilizes an aggregation of two-digit CIP, each of which corresponds to one or more academic departments or program areas. The CIP groupings are employed to facilitate comparisons, given the vast array of departments and programs in the individual institutions.

Table 2

STUDENT CREDIT-HOUR PRODUCTION BY LEVEL<sup>1</sup>  
 1984-85, CHANGE FROM 1983-84 AND FIVE-YEAR AVERAGE ANNUAL RATE OF CHANGE (1979-80 to 1984-85)  
 (Credit hours in 000s)

Institution <sup>2</sup>	Undergraduate level						Graduate level					
	Lower division			Upper division			Master's			First professional and doctor's <sup>3</sup>		
	Credit hours	Percentage change		Credit hours	Percentage change		Credit hours	Percentage change		Credit hours	Percentage change	
		One year	Five-year average		One year	Five-year average		One year	Five-year average		One year	Five-year average
State-related												
Penn State	1,033	-2%	a	538	-1%	a	54	1%	a	63	-1%	a
Pittsburgh	426	b	2%	218	1	1%	114	-3	-1%	73	1	-1%
Temple	288	15	-1	257	-4	1	65	-3	-9	75	-4	-4
Lincoln	27	-3	-1	6	5	-6	3	-31	-6	na	na	na
Total	1,774	1	a	1,019	-1	a	236	-3	a	211	-2	a
State-owned												
Indiana <sup>4</sup>	248	1	1	115	-3	1	19	-7	-1	c	c	c
West Chester	164	-3	1	63	-3	-1	16	11	-2	na	na	na
Millersville	134	-3	3	37	2	3	12	2	-5	na	na	na
Bloomsburg	125	5	2	51	-11	-4	8	2	-7	na	na	na
Slippery Rock	135	3	4	41	3	-1	7	15	-3	na	na	na
Edinboro	118	-1	3	44	6	b	8	-7	-4	na	na	na
Clarion	121	-1	1	42	4	1	7	27	9	na	na	na
Shippensburg	113	4	1	41	-1	1	12	1	-2	na	na	na
Kutztown	110	4	6	52	-3	4	5	2	-4	na	na	na
California	96	b	4	34	6	1	9	11	1	na	na	na
East Stroudsburg	87	4	2	31	-2	-2	8	1	1	na	na	na
Mansfield	59	1	3	21	2	b	3	43	-2	na	na	na
Lock Haven	56	-5	b	24	29	10	na	na	na	na	na	na
Cheyney	39	-14	-4	12	-6	-8	2	7	-2	na	na	na
Total	1,605	b	2	608	b	b	116	4	-2	na	na	na
All Institutions	3,379	b	a	1,627	-1	a	352	-1	a	211	-2	a

1. Data for each year represent the summer term preceding the academic year plus the academic year.

2. Arranged in descending order with respect to total full-time equivalent students for 1984-85.

3. The first professional and doctor's level excludes medical school data at all schools.

4. Indiana student credit-hour data for fiscal year 1979-80 from "State College and University Budgeting System Common Cost Accounting Reports."

a. In 1983-84, Penn State's data on student credit hours were affected by two major reporting changes: a change in the university's academic calendar (to two semesters from three terms in the academic year, and to a shorter summer term); and improved data collection procedures, which permitted the first-time inclusion of activities related to the university's continuing education credit program. Since then Penn State's data are comparable to current year data from the other institutions, but are noncomparable to prior years' data from Penn State and the other institutions.

b. Rounds to less than 1 percent.

c. Included in master's level.

na. Not applicable.

SOURCE: Reports provided by the individual institutions, 1980 to 1985.

Table 3

NUMBER AND PERCENTAGE DISTRIBUTION OF STUDENT CREDIT-HOUR PRODUCTION  
BY TYPE OF INSTITUTION, LEVEL AND CIP CLASSIFICATION  
1984-85  
(Credit hours in 000s)

CIP Classification	State-related Institutions						State-owned Institutions					
	Lower division	Percent- age of total	Upper division	Percent- age of total	Graduate <sup>1</sup>	Percent- age of total	Lower division	Percent- age of total	Upper division	Percent- age of total	Graduate <sup>1</sup>	Percent- age of total
Agriculture	7.8	a	17.1	2%	3.4	1%	0	0	0	0	0	0
Architecture and environmental design	4.4	a	12.1	1	.9	a	0	0	.1	a	b	a
Area and ethnic studies	5.2	a	5.1	1	.7	a	0	0	0	0	0	0
Business	126.7	7%	189.8	19	55.7	12	115.3	7%	137.5	23%	8.9	8%
Communications	15.8	1	26.8	3	2.6	1	28.3	2	22.5	4	1.8	2
Computer and Information sciences	72.6	4	25.1	2	11.4	3	45.9	3	12.8	2	.8	1
Education	85.3	5	67.0	7	89.0	20	168.5	11	158.3	26	62.0	53
Engineering	91.4	5	160.6	16	35.3	8	1.9	a	2.1	a	.1	a
Foreign languages	67.8	4	18.3	2	4.0	1	53.6	3	6.7	1	.6	1
Health	19.6	1	70.7	7	61.2	14	5.5	a	23.7	4	2.5	2
Home economics	20.9	1	11.7	1	3.1	1	7.8	a	9.5	2	.7	1
Industrial arts	0	0	0	0	0	0	3.5	a	2.3	a	.1	a
Law	.4	a	.9	a	52.8	12	0	0	0	0	0	0
Letters	223.5	13	81.4	8	14.3	3	226.6	14	24.9	4	4.3	4
Liberal/general studies	2.5	a	1.2	a	b	a	5.2	a	.1	a	0	0
Library and archival studies	.3	a	.2	a	3.5	1	1.7	a	2.0	a	2.7	2
Life sciences	90.0	5	26.4	3	7.5	2	95.2	6	19.7	3	2.4	2
Mathematics	234.0	13	35.9	4	7.3	2	167.8	10	22.8	4	3.5	3
Military sciences	2.5	a	2.8	a	0	0	6.2	a	2.3	a	0	0
Multi/interdisciplinary studies	18.0	1	4.3	a	1.6	a	5.4	a	.7	a	1.8	2
Parks and recreation	1.3	a	5.2	1	1.1	a	5.4	a	4.8	1	.3	a
Personal and social development	0	0	0	0	0	0	0	0	0	0	0	0
Philosophy, religion and theology	39.9	2	11.5	1	4.8	1	33.4	2	2.9	a	b	a
Physical sciences	188.5	11	35.2	3	22.5	5	117.8	7	14.8	2	1.9	2
Psychology	84.2	5	28.0	3	8.0	2	79.9	5	29.5	5	10.1	9
Public affairs and protective services	17.5	1	36.8	4	32.5	7	23.9	1	15.9	3	2.6	2
Social sciences	236.1	13	98.8	10	15.6	3	284.0	18	64.4	11	6.6	6
Trade and Industrial	10.4	1	b	a	0	0	.1	a	.7	a	0	0
Visual and performing arts	101.6	6	42.7	4	10.4	2	117.3	7	24.4	4	2.9	2
Other	5.0	a	3.0	a	.2	a	4.4	a	.7	a	0	0
Total <sup>2</sup>	1773.2	100	1018.8	100	449.0	100	1604.7	100	605.9	100	116.6	100

1. In addition to the master's level, the graduate level for Penn State, Pittsburgh, Temple and Indiana University includes first professional (excluding medical) and/or doctor's levels.

2. Because of rounding, CIP detail may not sum to total.

a. Rounds to less than 1 percent.

b. Rounds to less than 100 student credit hours.

SOURCE: Reports provided by the individual institutions, 1985.

Production by program area is related to the differing instructional missions of the individual institutions. Penn State, Pittsburgh and Temple are large research universities. Lincoln and the State-owned universities, with much smaller graduate programs, emphasize research to a much lesser degree. Obviously, the varying missions and focuses of the institutions also impinge upon the proportions of SCH produced at the various academic levels.

## DEGREES

### Production by Academic Level

During the 1984-85 school year Pennsylvania's public universities conferred a total of 35,161 undergraduate and graduate degrees, not including associate and medical degrees: 21,070 (60 percent) by the State-related institutions, and 14,091 (40 percent) by the State-owned institutions (table 4). These degrees represented about one-half of the total degrees conferred by all of the public and private institutions of higher education in the Commonwealth, not including associate and medical degrees. Table 4 shows degrees by academic level: more than 70 percent of the degrees from the State-related universities, and about 87 percent of the degrees from the State-owned universities, were undergraduate degrees. The table also shows that, at the State-related institutions, the total number of degrees increased by 2 percent from 1983-84 to 1984-85; a decrease in graduate degrees was more than offset by an increase in undergraduate degrees. In the State-owned institutions, the total number of degrees decreased by about 1 percent during the same period; most of this change was accounted for by a decrease in undergraduate degrees.

### Production by Program Area

During the 1984-85 school year, in the State-related universities, 47 percent of the undergraduate degrees were conferred in business, engineering and health, and 66 percent of the graduate degrees in business, education, engineering, health, and public affairs and protective services; significant numbers of undergraduate degrees were also granted in computer and information sciences, education and the social sciences (table 5). In the State-owned universities, 49 percent of the undergraduate degrees and 59 percent of the graduate degrees were conferred in business and education; other areas with significant numbers of undergraduate degrees included computer and information sciences and social sciences.

Table 4

DEGREES CONFERRED BY LEVEL<sup>1</sup>  
 1984-85, CHANGE FROM 1983-84 AND FIVE-YEAR AVERAGE ANNUAL RATE OF CHANGE (1979-80 to 1984-85)

Institution <sup>2</sup>	Total				Undergraduate level				Graduate level			
	Degrees	One-year change	Percentage change		Degrees	One-year change	Percentage change		Degrees	One-year change	Percentage change	
			One year	Five-year average			One year	Five-year average			One year	Five-year average
State-related												
Penn State	9,955	387	4%	a	8,318	321	4%	a	1,637	66	4%	a
Pittsburgh	6,118	-10	a	a	3,524	85	2	4%	2,594	-95	-4	a
Temple	4,802	-51	-1	-2%	2,982	-17	-1	-2	1,820	-34	-2	-3%
Lincoln	195	1	1	-2	126	3	2	-6	69	-2	-3	19
Total	21,070	327	2	-1	14,950	392	3	a	6,120	-65	-1	-1
State-owned												
Indiana	2,493	-135	-5	-1	2,160	-120	-5	-1	333	-15	-4	-4
West Chester	1,190	-207	-15	b	1,009	-166	-14	b	181	-41	-18	-8
Millersville	1,169	19	2	2	1,050	12	1	3	119	7	6	-7
Bloomsburg	1,203	-32	-3	-2	1,078	-6	-1	a	125	-26	-17	-9
Slippery Rock	1,043	82	9	-2	933	71	8	-1	110	11	11	-5
Edinboro	872	-57	-6	-4	768	-2	a	-2	104	-55	-35	-11
Clarion	1,021	34	3	a	864	7	1	a	157	27	21	6
Shippensburg	1,328	-12	-1	-1	979	-50	-5	-1	349	38	12	-1
Kutztown	983	38	4	2	875	37	4	3	108	1	1	-4
California	781	56	8	-2	643	29	5	-2	138	27	24	-2
East Stroudsburg	731	-32	-4	-1	649	1	a	-1	82	-33	-29	a
Mansfield	468	42	10	-1	419	41	11	-1	49	1	2	0
Lock Haven	501	46	10	5	501	46	10	5	na	na	na	na
Cheyney	308	-3	-1	-2	276	-12	-4	-3	32	9	39	1
Total	14,091	-161	-1	-1 <sup>c</sup>	12,204	-112	-1	a <sup>3</sup>	1,887	-49	-3	-5
All Institutions	35,161	166	a	-1 <sup>c</sup>	27,154	280	1	a <sup>3</sup>	8,007	-114	-1	-2

1. Data for each year represent the summer term preceding the academic year plus the academic year. Undergraduate degrees include only bachelor's degrees. Graduate degrees include master's at all institutions except Lock Haven which does not have a master's program, first professional (excluding medical) and doctor's at Pittsburgh and Temple, and doctor's at Penn State and Indiana University.

2. Arranged in descending order with respect to total full-time equivalent students for 1984-85.

3. Excludes West Chester.

a. Rounds to less than 1 percent.

b. Noncomparable data.

c. Excludes West Chester.

na. Not applicable.

SOURCE: Reports provided by the individual institutions, 1980 to 1985.



NUMBER AND PERCENTAGE DISTRIBUTION OF DEGREES CONFERRED  
BY TYPE OF INSTITUTION, LEVEL AND CIP CLASSIFICATION<sup>1</sup>  
1984-85

CIP classification	State-related Institutions				State-owned Institutions			
	Undergraduate		Graduate		Undergraduate		Graduate	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Agriculture	394	3%	71	1%	0	0	0	0
Architecture and environmental design	111	1	27	a	23	a	0	0
Area and ethnic studies	4	a	5	a	4	a	0	0
Business	3,107	21	924	15	3,092	25%	182	10%
Communications	720	5	43	1	635	5	54	3
Computer and information sciences	830	6	189	3	788	6	31	2
Education	866	6	1,249	20	2,874	24	929	49
Engineering	2,805	19	585	10	111	1	1	a
Foreign languages	138	1	41	1	92	1	10	1
Health	1,039	7	662	11	657	5	84	4
Home economics	231	2	31	1	183	2	8	a
Industrial arts	0	0	0	0	0	0	0	0
Law	54	a	568	9	0	0	0	0
Letters	557	4	130	2	345	3	60	3
Liberal/general studies	172	1	16	a	96	1	0	0
Library and archival studies	0	0	78	1	44	a	74	4
Life sciences	526	4	93	2	288	2	42	2
Mathematics	258	2	72	1	179	1	15	1
Military sciences	0	0	0	0	0	0	0	0
Multi/interdisciplinary studies	196	1	25	a	129	1	14	1
Parks and recreation	85	1	36	1	152	1	6	a
Personal and social development	0	0	0	0	0	0	0	0
Philosophy, religion and theology	37	a	56	1	22	a	1	a
Physical sciences	440	3	202	3	317	3	43	2
Psychology	476	3	94	2	478	4	126	7
Public affairs and protective services	620	4	633	10	437	4	115	6
Social sciences	942	6	185	3	798	7	51	3
Trade and Industrial	0	0	0	0	12	a	0	0
Visual and performing arts	372	2	139	2	390	3	31	2
Total <sup>2</sup>	14,980	100	6,154	100	12,146	100	1,877	100

1. Undergraduate degrees include only bachelor's at all institutions. Graduate degrees include master's at all institutions except Lock Haven which does not have a master's program, first professional (excluding medical) and doctor's at Pittsburgh and Temple, and doctor's at Penn State and Indiana University.

2. Because of rounding, totals may not equal 100 percent.

a. Rounds to less than 1 percent.

SOURCE: Preliminary data furnished by Pennsylvania Department of Education, Division of Data Services, January 1986; data gathered using U.S. Department of Education ED (NCES) Form 2300-2.1A-1, 6/86.

## OUTPUT TRENDS<sup>7</sup>

### Enrollment Levels and Composition

Between 1980-81 and 1984-85, total FTE students increased by small amounts at Pittsburgh and Lincoln, but decreased by nearly 3,000 (11 percent) at Temple. Penn State's reported FTE students for 1984-85 are noncomparable with its reported FTE students for 1980-81.<sup>8</sup> Since 1980-81, total FTE students at the State-owned institutions have increased by a small number each year.

During this same period total FTE enrollments increased at other types of institutions of higher education in the Commonwealth and the nation. Since Fall 1979 total FTE students at community colleges have increased by nearly 18 percent, and at private independent and private State-aided institutions by about 5 percent. In the U.S. as a whole, from Fall 1979 to Fall 1983, total FTE students at public institutions increased by 8 percent, and at private institutions by 9 percent.<sup>9</sup>

While total higher education enrollment in Pennsylvania's public universities has remained relatively stable over the past five years, the composition has changed in a number of ways. As can be seen in table 1, a decrease in total FTE graduate students has

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<sup>7</sup>Throughout this report, trends are computed for various levels of aggregation, e.g., individual institutions, groups of institutions, sectors, etc. If a trend refers to a group or sector, the trend cannot be inferred from each individual institution in the group or sector. Detailed data for prior years are available upon request from the Joint State Government Commission.

<sup>8</sup>In 1983-84 Penn State's data on FTE students (or student credit hours), FTE faculty and faculty salaries were affected by two major reporting changes: a change in the university's academic calendar (to two semesters from three terms in the academic year, and to a shorter summer term); and improved data collection procedures, which permitted the first-time inclusion of activities related to the university's continuing education credit program. Since then Penn State's data are comparable to current year data from the other institutions, but are noncomparable to prior years' data from Penn State and the other institutions. Therefore, output and input trends for Penn State are not included in this report.

<sup>9</sup>Higher Education Summer and Fall Enrollments, 1984 and U.S. Department of Education, National Center for Education Statistics, Higher Education General Information Survey, Fall Enrollment in Colleges and Universities, various years.

been offset by an increase in total FTE undergraduate students. Also, the ratios of full-time to total students, of male students to total students, and of out-of-state students to total students, have all increased during recent years.<sup>10</sup> Finally, it is generally maintained that the proportion of older students to total students has risen. These relative enrollment increases, related to social, economic and demographic factors, may have compensated for a relative decline in the enrollment of more "traditional" students.<sup>11</sup>

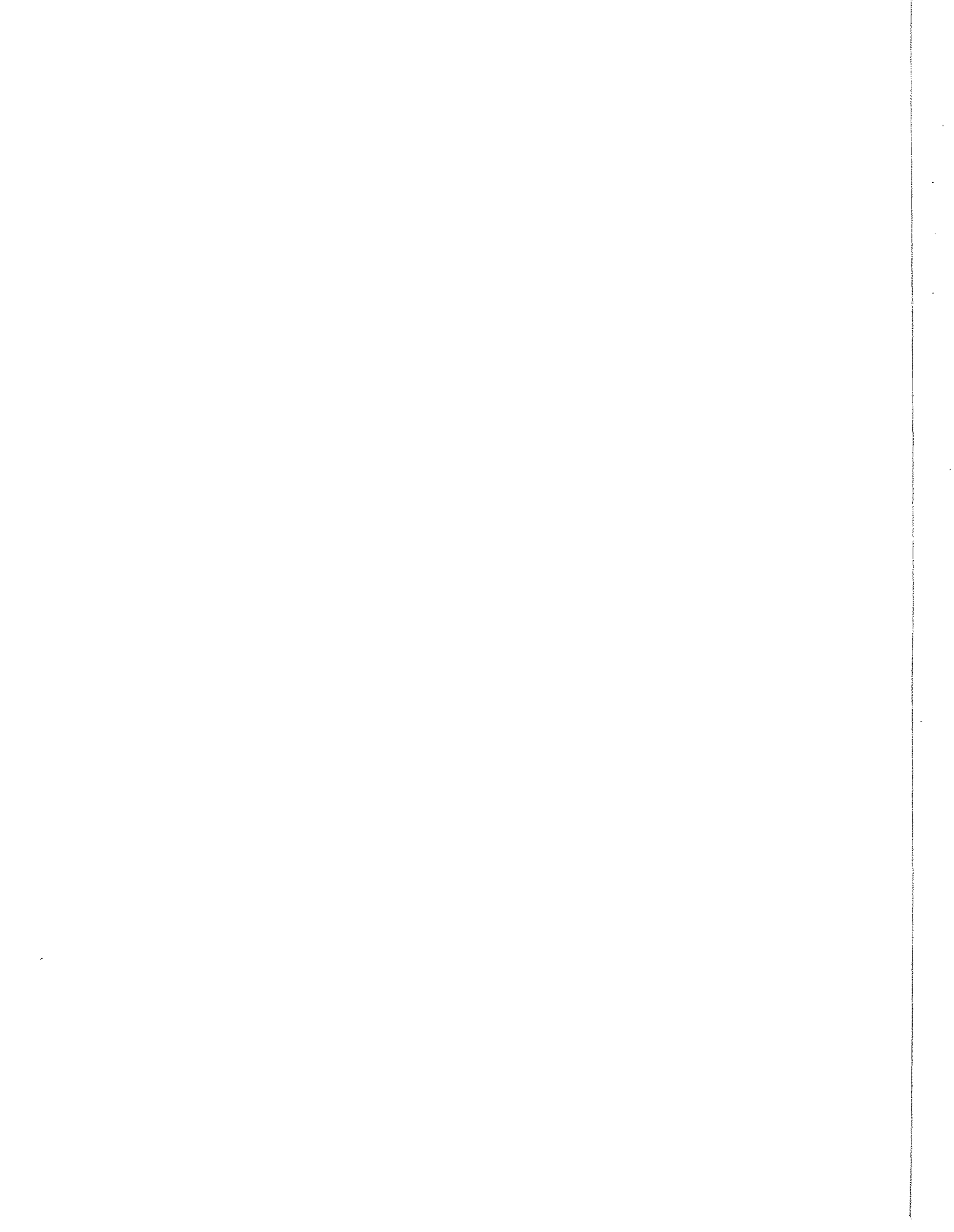
### Degrees and Student Majors

Between 1979-80 and 1984-85, undergraduate degrees in business increased to 21 from 17 percent of the total undergraduate degrees conferred by the State-related universities, and to 25 from 17 percent of the total undergraduate degrees conferred by the State-owned universities. Undergraduate degrees in engineering increased to 19 from 14 percent of the total undergraduate degrees granted by the State-related universities. Conversely, undergraduate degrees in education and the social sciences both decreased as percentages of total undergraduate degrees at both groups of institutions: education degrees to 6 from 9 percent, and social science degrees to 6 from 8 percent at the State-related group; education degrees to 24 from 34 percent, and social science degrees to 7 from 11 percent at the State-owned group. These changes in degrees mirror the changes in student majors and degrees observed at the national level: a trend toward areas related to vocations and away from areas related to education and the arts and sciences.

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<sup>10</sup>Higher Education Summer and Fall Enrollments, 1984 and Kenneth R. Reeher, Trends in Pennsylvania Students' Enrollments, Costs, Incomes and Financial Aid: A Report to the Governor's Commission on Financing Post-Secondary Education, Pennsylvania Higher Education Assistance Agency, April 19, 1984.

<sup>11</sup>The ratio of SCH (or FTE students) to undergraduate and graduate degrees has generally increased in recent years at both the State-related and State-owned universities (especially the latter). Increases in this ratio probably indicate that student dropout rates are increasing, or that students are taking a longer time to earn degrees, or both. The changing SCH-to-degree ratios may be related to the changing composition of enrollment.



### III. Instructional Faculty Input

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The input most directly related to instructional output, whether measured by student credit hours (or FTE students) or degrees, is instructional faculty. Other inputs are complements to instructional faculty: classrooms and labs, teaching materials, support staff, etc., are all combined with faculty to produce instructional output. The costs of these other inputs are, however, often not entirely related to instruction, and therefore must be allocated to instruction in some fairly arbitrary manner. To avoid such an allocation, instructional faculty and the cost of instructional faculty--instructional faculty salary--are the input and cost measures focused upon in this section.

During academic year 1984-85 a total of 9,341 full-time ranked faculty members were engaged in instructional activities in the Commonwealth's public universities: 5,187 (56 percent) in the State-related institutions and 4,154 (44 percent) in the State-owned institutions. The full-time ranked instructional faculty employed by the public universities represented approximately 44 percent of this faculty employed by all of the public and private institutions of higher education in Pennsylvania.<sup>12</sup>

#### FULL-TIME EMPLOYED FACULTY AND WORKLOADS

In Fall 1984, 5,500 faculty members were employed full-time by the State-related universities; at the State-owned institutions this faculty numbered 4,257 (table 6). These totals represent

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<sup>12</sup>Pennsylvania Department of Education, Higher Education Faculty and Staff, 1984-85. For comparisons of individual institutions across sectors of higher education, full-time ranked instructional faculty is the most commonly used faculty measure.

Table 6

FULL-TIME EMPLOYED FACULTY WORKWEEK ACTIVITIES  
1984-85, AND PERCENTAGE CHANGE FROM 1983-84

Institution <sup>1</sup>	Full-time <sup>2</sup> employed faculty head count	Average weekly hours per full-time employed faculty member <sup>3</sup>											
		Contact hours				Instruc- tional support	Percent- age change	Research	Percent- age change	Other university service	Percent- age change	Total work- week	Percent- age change
		Total	Percent- age change	Under- graduate	Graduate								
State-related													
Penn State	2,711	9.2	-1%	7.4	1.8	20.0	-1%	10.5	4%	11.8	0	51.5	0
Pittsburgh	1,536	9.1	-1	5.1	4.0	16.6	-4	14.8	3	11.3	2%	51.8	a
Temple	1,181	9.7	-5	6.3	3.4	15.6	-2	10.0	22	16.0	-2	51.3	1%
Lincoln	72	11.7	2	10.8	.9	17.3	-6	11.0	9	10.8	2	50.8	a
Total	5,500	9.3	-3	6.5	2.8	18.1	-2	11.6	6	12.5	0	51.5	0
State-owned													
Indiana	659	12.2	-4	11.0	1.2	18.4	-1	10.4	-4	18.6	4	59.6	a
West Chester	467	11.8	1	10.6	1.2	18.6	2	9.2	1	20.8	2	60.4	2
Millersville	292	11.4	-1	10.9	.5	15.4	-4	8.9	-1	16.6	0	52.3	-2
Bloomsburg	326	11.5	1	10.8	.7	16.6	-1	8.0	7	16.2	1	52.3	1
Slippery Rock	331	11.9	0	11.4	.5	18.6	0	8.4	0	17.2	0	56.1	0
Edinboro	322	12.7	1	11.8	.9	19.6	2	7.9	0	13.6	-6	53.8	-1
Clarion	305	11.2	-2	10.6	.6	17.3	-5	6.8	-15	15.6	15	50.9	-1
Shippensburg	292	10.5	-3	9.6	.9	17.3	-5	8.1	-2	17.2	15	53.1	2
Kutztown	298	12.3	-1	11.9	.4	16.0	-6	7.8	-11	16.6	-2	52.7	-4
California	257	13.1	25	12.1	1.0	15.7	0	7.2	-4	17.1	-4	53.1	3
East Stroudsburg	231	11.2	-8	10.4	.8	18.4	-6	9.1	1	17.3	8	56.0	-1
Mansfield	166	12.9	3	11.8	1.1	22.1	-5	10.4	-2	15.1	6	60.5	a
Lock Haven	166	11.6	-1	11.6	na	17.5	4	7.0	-8	17.2	-4	53.3	-1
Cheyney	145	10.9	-2	10.5	.4	14.8	22	7.8	15	17.6	-4	51.1	6
Total	4,257	11.8	-1	11.0	.8	17.7	-1	8.6	-1	17.2	2	55.3	0
All Institutions	9,757	10.4	-1	8.5	1.9	17.9	-2	10.3	3	14.6	2	53.2	a

1. Arranged in descending order with respect to total full-time equivalent students for 1984-85.

2. The number of full-time employed faculty for 1984-85 represents those reported by each school for the fall term.

3. Average calculated using only those full-time employed faculty in the fall who reported a complete workweek of 100 hours or less.

a. Rounds to less than 1 percent.

na. Not applicable.

SOURCE: Reports provided by the individual institutions, 1984 and 1985.

one-year increases of 1 and 2 percent at the two types of institutions, respectively.

Table 6 shows that the overall average reported workweek of the full-time employed faculty in the public universities was 53.2 hours; this overall average workweek was virtually unchanged from the previous year. Total faculty hours spent in classroom contact with students averaged 10.4 per week: 9.3 hours at the State-related universities and 11.8 hours at the State-owned universities; these averages represent decreases of 3 and 1 percent, respectively, from the previous year. Individual institutions with one-year increases in total student contact hours include Bloomsburg, California, Edinboro, Lincoln, Mansfield and West Chester; institutions with larger-than-average one-year decreases include Cheyney, Clarion, East Stroudsburg, Indiana, Shippensburg and Temple. In the aggregate, faculty time spent in other activities--instructional support, research and other university activities--was little changed from Fall 1983; in specific institutions, faculty hours were shifted between the various workweek categories.

#### FTE INSTRUCTIONAL FACULTY AND SALARIES

##### Related to Academic Ranks

During the 1984-85 school year the FTE instructional faculty at the public universities totaled 10,896: 6,599 (61 percent) at the State-related universities and 4,297 (39 percent) at the State-owned universities (table 7).<sup>13</sup> These faculties represent increases of 1 and 2 percent for the two types of institutions, respectively, over 1983-84.

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<sup>13</sup>The faculty included in table 7 are "full-time equivalent" instructional faculty, i.e., full-time persons plus the full-time equivalency of part-time persons, for the summer term of 1984 plus the 1984-85 academic year. The FTE instructional faculty is the faculty which produces the instructional output, and whose cost efficiency is measured, in this report. In contrast, the faculty included in table 6 are "full-time employed" faculty only, for the fall term of 1984. The full-time faculty is the faculty whose workweeks are measured in this report.

Table 7

AVERAGE INSTRUCTIONAL SALARIES OF FULL-TIME EQUIVALENT INSTRUCTIONAL FACULTY AND PERCENTAGE DISTRIBUTION BY RANK<sup>1</sup>  
1984-85  
(Dollar amounts in 000s)

Institution <sup>2</sup>	FTE Instructional faculty		Average Instructional salary		Professor		Associate professor		Assistant professor		Instructor		Non-ranked <sup>3</sup>	
	Number	Percentage change	Amount	Percentage change	Average Instruc-	Percent-	Average Instruc-	Percent-	Average Instruc-	Percent-	Average Instruc-	Percent-	Average Instruc-	Percent-
		1983-84 to 1984-85		1983-84 to 1984-85	tional salary	age of faculty	tional salary	age of faculty	tional salary	age of faculty	tional salary	age of faculty	tional salary	age of faculty
State-related														
Penn State	3,136	3%	\$26.0	4%	\$41.6	15%	\$31.5	18%	\$24.9	27%	\$18.0	17%	\$19.2	23%
Pittsburgh	1,815	-1	26.8	6	40.3	19	28.4	28	22.7	19	14.7	12	23.2	22
Temple	1,545	2	26.2	6	36.9	29	28.9	26	23.9	15	13.1	13	15.3	17
Lincoln	103	4	19.3	6	27.0	14	23.1	14	17.7	40	15.5	21	17.7	11
Total	6,599	1	26.2	5	39.4	19	29.7	23	24.0	22	16.2	15	19.6	21
State-owned														
Indiana	679	3	27.7	3	33.8	36	28.4	28	22.9	26	16.6	10	21.1	a
West Chester	465	0	28.8	4	36.3	29	29.7	36	23.6	23	17.5	12	36.5	a
Millersville	327	1	28.0	4	34.0	32	27.9	35	23.2	25	19.0	8	47.6	a
Bloomsburg	335	-3	28.2	4	34.9	30	29.1	32	22.8	29	19.2	9	na	0
Slippery Rock	324	3	29.5	5	35.3	42	29.4	24	23.7	25	19.0	9	22.3	a
Edinboro	322	2	30.8	5	35.4	43	29.7	33	24.7	23	18.7	1	29.9	a
Clarion	294	-1	28.6	3	34.8	33	29.3	31	23.5	27	19.5	8	20.1	1
Shippensburg	290	1	30.2	3	36.0	40	29.0	34	23.9	21	19.5	5	34.2	a
Kutztown	306	8	29.5	2	35.9	35	29.3	33	24.0	25	18.9	7	31.5	a
California	245	2	31.3	4	36.3	41	30.4	39	24.9	12	18.4	8	35.5	a
East Stroudsburg	247	6	28.1	a	33.1	43	26.6	33	22.5	19	16.4	5	29.4	a
Mansfield	168	8	28.5	1	36.8	27	29.2	35	23.1	28	17.8	10	na	0
Lock Haven	151	-1	31.7	5	36.9	37	30.4	45	24.4	15	21.5	3	30.5	a
Cheyney	144	5	30.2	3	35.1	34	29.2	46	26.4	10	21.0	9	34.1	1
Total	4,297	2	29.1	4	35.1	36	29.1	33	23.5	23	18.3	8	28.2	a
All institutions	10,896	2	27.3	4	37.1	26	29.4	27	23.8	22	16.7	12	19.7	13

1. Average instructional salary is calculated by dividing the total instructional salary paid to all staff members in the respective rank categories by their total full-time equivalency in the instructional function. One full-time equivalent faculty represents one full-time workload for two terms (one academic year). The summer term is treated as one term or one-half the academic year. Data for each year represent the summer term preceding the academic year plus the academic year.

2. Arranged in descending order with respect to total full-time equivalent students for 1984-85.

3. The full-time equivalency of nonranked faculty members is based on the time spent in instruction of all nonranked personnel, including lecturers, administrators, librarians, research staff and graduate assistants.

a. Rounds to less than 1 percent.

na. Not applicable.

SOURCE: Reports provided by the individual institutions, 1984 and 1985.



Table 7 shows that the overall average instructional salary for ranked and nonranked FTE instructional faculty was \$26,200 at the State-related institutions, and \$29,100 at the State-owned institutions. These averages represent increases of 5 and 4 percent, respectively, for the two types of institutions over the previous year.<sup>14</sup>

Table 7 shows that, as a group, the State-owned universities have a significantly larger percentage of FTE instructional faculty in the professor and associate professor ranks (69 percent) than do the State-related universities (42 percent). Even though the average salary for each of these ranks is lower for the State-owned institutions, the use of a larger percentage of faculty in these two top ranks raises this group's overall average salary above that for the State-related schools. Differences in the faculty rank mix at the two types of universities result, in large part, from the sizes and nature of these institutions. The larger State-related universities utilize large numbers of graduate students as teaching assistants, especially in lower-level courses. The use of larger proportions of such persons lowers the overall average salary for the State-related institutions, relative to the overall average salary for the State-owned institutions.

#### Compared with Other Institutions

A comparison of the average salaries for the full-time ranked instructional faculty at Pennsylvania's public universities with the average salaries for comparable faculty at other individual institutions in the Commonwealth, and public and private institutions in the nation as a whole, is informative.

For academic year 1984-85, the overall average salary for full-time ranked instructional faculty at public institutions of higher education in the U.S. was \$31,200; for private institutions

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<sup>14</sup>Average instructional salaries are computed by dividing the total instructional salary for each rank by the respective number of FTE faculty. Caveat: the changes in average salaries shown in table 7 do not necessarily correspond either to salary changes for individual faculty members or to general salary changes for all faculty members in a given institution. Average salary changes also reflect changes in the rank distributions of faculty; changes in rank compositions will change average salaries, independent of changes in individual salaries.

the overall average was \$30,500 (table 8).<sup>15</sup> The comparable average salaries for the Commonwealth's State-related and State-owned universities were \$31,600 and \$31,000, respectively. The percentage of full-time ranked faculty in the two top ranks averaged 67 and 63 percent in public and private colleges and universities throughout the nation, and 60 and 71 percent in the State-related and State-owned universities in Pennsylvania, respectively.

Average salaries for full-time ranked instructional faculty at selected private colleges and universities in the Commonwealth and selected public institutions in other states are also given in table 8.<sup>16</sup> The average salaries for this faculty at the State-related universities are generally lower than those for this faculty at both the comparable private institutions in Pennsylvania and the public institutions of the other states included in this list. Average salaries at the State-owned universities are generally higher than those for selected public or private institutions which award only bachelor's degrees in Pennsylvania and the other states, but generally lower than those for the selected public and private institutions which award both bachelor's and advanced degrees in Pennsylvania and the other states.

#### INPUT TRENDS

##### Full-Time Employed Faculty and FTE Instructional Faculty

Between Fall 1980 and Fall 1984, the total full-time employed faculty increased by 6 at Pittsburgh, but decreased by 67 (5 percent) at Temple and 4 at Lincoln. During this interval the total full-time employed faculty increased by 65 at the State-owned universities; the largest one-year increase (85) occurred between Fall 1983 and Fall 1984.

Between the 1980-81 and 1984-85 school years, the total FTE instructional faculty decreased by 17 at Pittsburgh and 196 (11 percent) at Temple, but increased by 8 at Lincoln. During this time, the total FTE instructional faculty increased by approximately

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<sup>15</sup>As noted in footnote 12, for comparisons of individual institutions across sectors of higher education, full-time ranked instructional faculty is the most commonly used faculty measure.

<sup>16</sup>The selection criteria include comparability of degrees offered and diversity of locations.

Table 8  
 AVERAGE INSTRUCTIONAL FACULTY SALARIES<sup>1</sup> BY TYPE<sup>2</sup> AND RANK  
 PERCENTAGE OF FULL-TIME FACULTY IN EACH RANK  
 SELECTED PUBLIC AND PRIVATE INSTITUTIONS OF HIGHER EDUCATION  
 ACADEMIC YEAR, 1984-85

Group	Institution	Average salary (000s)					Total ranked Instructional faculty	Percentage of ranked faculty			
		All ranks <sup>3</sup>	Prof.	Assoc. prof.	Asst. prof.	Instr.		Prof.	Assoc. prof.	Asst. prof.	Instr.
<b>I. INSTITUTIONS AWARDING ONLY BACHELOR'S DEGREES</b>											
State-owned (Pennsylvania)											
	Lock Haven	\$31.5	\$37.5	\$30.5	\$25.0	\$19.9	165	36%	44%	14%	6%
Private (Pennsylvania)											
	Dickinson College	29.1	39.1	29.9	23.4	20.8	118	24	35	29	12
	Franklin & Marshall College	32.6	43.9	33.5	22.7	20.5	131	32	30	34	4
	Gettysburg College	31.0	41.0	31.8	23.9	23.3	129	26	38	30	6
	Lebanon Valley College	24.0	28.2	24.8	19.4	nd	67	33	31	30	6
	Swarthmore College	37.2	46.7	32.6	25.1	nd	137	49	22	25	4
	Wilson College	22.5	27.2	21.3	19.2	nd	32	35	31	31	3
Public (other states)											
	Mary Washington College (VA)	26.2	31.1	27.7	22.2	19.1	148	30	28	35	7
	University of N.C. at Asheville (NC)	27.8	36.0	28.2	25.4	21.8	85	24	35	32	9
<b>II. INSTITUTIONS AWARDING BACHELOR'S AND ADVANCED DEGREES</b>											
State-related and State-owned											
	Penn State <sup>4</sup>	32.7	44.0	32.5	26.8	17.4	1,435	36	28	25	11
	Pittsburgh <sup>4</sup>	34.7	46.7	32.6	25.8	18.0	1,211	34	37	23	6
	Temple	34.2	41.5	31.9	26.3	19.7	1,168	41	35	20	4
	Lincoln	23.5	32.2	26.6	22.1	12.9	70	20	20	47	13
	Bloomsburg	29.8	36.5	29.9	24.3	19.7	328	32	33	29	6
	California <sup>5</sup>	32.2	37.0	30.7	25.1	19.8	261	44	37	16	3
	Cheyney	32.4	38.3	31.5	25.7	19.6	138	34	49	11	6
	Clarion <sup>4</sup>	31.2	36.9	30.4	26.6	19.9	248	36	33	26	5
	East Stroudsburg	29.7	35.3	27.9	23.7	20.3	236	40	35	22	3
	Edinboro	32.4	37.3	30.9	25.5	na	299	44	32	24	0
	Indiana	30.5	37.1	30.8	24.4	18.0	668	37	28	29	6
	Kutztown	31.0	37.2	30.4	24.2	20.0	280	37	35	24	4
	Mansfield	29.8	37.5	30.6	23.4	nd	186	27	37	33	3
	Millersville	30.5	37.5	30.7	24.6	20.0	306	31	36	27	6
	Shippensburg	32.0	37.4	30.3	24.8	20.5	273	43	34	21	2
	Slippery Rock	31.2	37.5	30.7	24.5	20.1	321	41	26	26	7
	West Chester	31.1	37.4	30.6	24.7	20.9	444	32	42	23	3
Private (Pennsylvania)											
	Bryn Mawr College	34.1	41.2	32.1	26.2	nd	120	51	28	19	2
	Carnegie-Mellon University	40.8	52.0	35.1	30.6	21.1	461	43	26	30	1
	Lehigh University	38.8	46.5	33.8	26.6	28.1	348	51	28	18	3
	University of Pennsylvania	42.8	52.5	37.3	30.4	na	1,037	48	25	27	0
Public (other states)											
	Eastern New Mexico U.-Main (NM)	27.6	35.7	29.8	25.0	20.4	144	17	29	42	12
	Lake Superior St. College (MI)	27.0	31.7	28.2	24.2	20.0	107	21	40	27	12
	Rutgers University-Camden (NJ)	32.4	48.8	34.1	24.3	20.6	202	20	41	27	12
	SUNY at Stony Brook (NY)	40.7	53.5	36.9	27.4	nd	609	43	29	27	1
	University of Maryland at College Park (MD)	34.3	45.6	33.3	27.1	19.7	1,249	35	35	22	8
	University of Michigan at Ann Arbor (MI)	39.5	48.1	35.9	29.5	20.9	1,583	54	22	22	2
	University of North Carolina at Chapel Hill (NC)	37.2	46.2	34.1	27.8	23.9	1,029	49	27	23	1
	University of Texas at Austin (TX)	35.6	45.5	31.1	27.1	18.9	1,847	44	28	26	2
PENNSYLVANIA AVERAGES <sup>5</sup>											
	State-related institutions	31.6	43.5	31.8	25.2	18.8	5,034	29	31	29	11
	State-owned institutions	31.0	37.2	30.4	24.6	19.6	4,154	37	34	24	5
U.S. AVERAGES <sup>6</sup>											
	Public institutions	31.2	39.6	30.2	25.0	19.5	207,529	37	30	26	7
	Private institutions	30.5	40.5	29.2	23.8	18.2	85,807	34	29	29	8

- All data include only full-time ranked faculty whose major assignment is instruction--including those with release time for research--and excludes part-time and administrative faculty and faculty for preclinical and clinical medicine. Average salaries are based on contracted salaries (adjusted to a standard academic year basis, when necessary), excluding summer teaching, extra loads, etc.
- Institutions in group I award only the bachelor's degree or equivalent. Institutions in group II also award advanced degrees. Group I corresponds to Academe category IIB, and group II corresponds to Academe categories I plus IIA (See source below).
- The all ranks average includes lecturers, not separately shown here.
- Main Campus data.
- Data from Pennsylvania Department of Education, Bureau of Information Systems Division of Data Services.
- Data from Maryse Eymonerie Associates (MEA), McLean, Virginia.
- Not applicable.
- No data.

SOURCE: "Annual Report on the Economic Status of the Profession, 1984-85," Academe 71, Bulletin of the American Association of University Professors (Washington, D.C.: March-April 1985), pp. 20-72.

110 at the State-owned universities.<sup>17</sup> In 1980-81 and 1984-85 the ratios of FTE students to FTE instructional faculty in the various institutions were:

<u>Institution(s)</u>	<u>1984-85</u>	<u>1980-81</u>
Penn State	a	a
Pittsburgh	16.1	15.8
Temple	15.5	15.5
Lincoln	12.0	12.8
State-owned (average) <sup>b</sup>	18.2	17.9

a. Noncomparable data (see footnote 8).

b. Excludes Millersville (see footnote 17).

#### Average Instructional Faculty Salary

Between 1980-81 and 1984-85, the average instructional salary of the FTE instructional faculty increased by \$6,000 (29 percent) at Pittsburgh, by \$4,900 (23 percent) at Temple, and by \$2,000 (12 percent) at Lincoln. During these years the average instructional salary of the FTE instructional faculty increased by approximately \$4,300 (17 percent) at the State-owned universities.<sup>18</sup> Again, these increases in average salary were caused in part by salary changes, and in part by changes in the rank distributions of the faculty at the various universities. During this time, the percentage of FTE instructional faculty in the top two ranks (professor and associate professor) increased by 3 percent at Pittsburgh and 6 percent at Temple, but decreased by 7 percent at Lincoln. The decrease in the top two ranks at the State-owned institutions was approximately 3 percent. The more rapid increase in the average instructional salary of the FTE instructional faculty at the State-related universities as a group during recent years has narrowed the gap between the average salary for these universities as a group and the average salary for the State-owned universities as a group.

Between the academic years 1980-81 and 1984-85, the average salary of the full-time ranked instructional faculty at institutions

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<sup>17</sup>The increase is approximate because Millersville's reported FTE instructional faculties for 1980-81 and 1984-85 are noncomparable.

<sup>18</sup>The increases are approximate because Cheyney's, Millersville's and West Chester's reported FTE instructional faculty salaries for various years in this interval are noncomparable.

in the various sectors of higher education in Pennsylvania, as well as at public and private institutions in the U.S. as a whole, increased at the following rates in the various sectors:<sup>19</sup>

Pennsylvania

State-related universities	27.9%
State-owned universities	18.5
Community colleges	45.1
Private institutions	35.8

U.S.

Public institutions	28.9
Private institutions	approx. 35.0

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<sup>19</sup>Higher Education Faculty and Staff, 1984-85; Our Colleges and Universities Today--Faculty and Other Personnel, vol. XVIII (1980-81), no. 7; Academe 71 and 67.



## IV. Cost Efficiency

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### INSTRUCTIONAL FACULTY SALARY COST PER STUDENT CREDIT HOUR (SCH COST)

Cost efficiency is the minimization of the input cost of producing a given amount of output. The simplest measure which relates input cost to output in higher education is the average instructional faculty salary cost per student credit hour (or FTE student) produced.

#### By Academic Level

During the 1984-85 school year, the average instructional faculty salary cost per student credit hour (SCH cost) in the State-related universities was \$39 at the undergraduate level and \$112 at the master's level; in the State-owned universities the SCH cost was \$51 at the undergraduate level and \$113 at the master's level (table 9).

Compared to 1983-84, the 1984-85 SCH cost increased by \$2 (5 percent) and \$11 (11 percent) at the undergraduate and master's levels in the State-related institutions, and \$3 (6 percent) and \$2 (2 percent) at these two academic levels in the State-owned institutions.

Table 9 shows that SCH cost varies widely among the individual institutions. However, the data illustrate two important general relationships. First, SCH cost tends to vary inversely with the size (or scale) of output: at all academic levels, average instructional faculty salary cost per SCH tends to decrease as the quantity of SCH produced increases. Second, SCH cost tends to vary directly with academic levels: for all quantities of SCH, average instructional faculty salary cost per SCH tends to increase as the academic level increases.

Table 9  
 AVERAGE INSTRUCTIONAL FACULTY SALARY COST  
 PER STUDENT CREDIT HOUR BY LEVEL  
 1984-85

Institution <sup>1</sup>	Instructional faculty salary cost per student credit hour <sup>2</sup>			
	Undergraduate level			
	Total Undergraduate level	Lower division	Upper division	Master's
State-related				
Penn State	\$36	\$31	\$47	\$98
Pittsburgh	38	28	58	129
Temple	44	37	52	95
Lincoln	53	44	92	72
Total	39	31	51	112
State-owned				
Indiana	44	34	65	149
West Chester	52	42	76	105
Millersville	48	39	79	84
Bloomsburg	50	42	69	88
Slippery Rock	50	41	79	114
Edinboro	54	48	72	141
Clarion	46	39	67	118
Shippensburg	49	44	64	98
Kutztown	53	39	81	93
California	51	42	76	123
East Stroudsburg	54	45	78	75
Mansfield	54	39	96	130
Lock Haven	60	48	87	na
Cheyney	79	67	118	188
Total	51	42	74	113
All Institutions	44	36	60	112

1. Arranged in descending order with respect to total full-time equivalent students for 1984-85.

2. The instructional faculty salary cost per student credit hour for each level was calculated as follows: the instructional salary for each rank was assigned by level according to the percentage distribution of the course (assigned) credits within each rank. The salary determined by this method for each rank was summed by level and divided by the total student credit-hour production at that level. In the case of individual instruction, one course credit was attributed to every three student credit hours produced in individual instruction.  
 na. Not applicable.

SOURCE: Reports provided by the individual institutions, 1985.



### By Program Area

SCH cost also varies widely by program area at both types of public universities. Table 10 shows that CIP with substantially higher than average undergraduate SCH cost ("high-cost" CIP) at the State-related universities include agriculture, area and ethnic studies, education, health, parks and recreation, and trade and industrial. For these institutions as a group, psychology is a "low-cost" undergraduate CIP. For the State-owned universities as a group, "high-cost" undergraduate CIP include engineering, health, industrial arts, and trade and industrial, and "low-cost" undergraduate CIP include business and liberal/general studies.

Like table 9, table 10 clearly shows that SCH cost tends to vary directly with academic levels.

### DETERMINANTS OF SCH COST

An appendix to this report presents a model of SCH cost determination. The model shows that there are three variables which university administrators can control, at least to some degree, to affect SCH cost: average instructional faculty salary, average class (section) size and the number of classes (sections) per course. Further, the model shows that SCH cost is positively related to the level of average faculty salary, and negatively related to both average class size and the number of classes per course.

#### Average Instructional Faculty Salary

The average instructional salary of the FTE instructional faculty was discussed above (see table 7 and discussion). Since average salary tends to vary directly with faculty rank, and faculty rank tends to vary directly with academic level, average faculty salary also tends to vary directly with academic level in all program areas.

#### Average Class (Section) Size

Average class (section) size tends to vary inversely with academic level; lower-division undergraduate classes are generally larger in size than upper-division classes, and upper-division

Table 10

AVERAGE INSTRUCTIONAL FACULTY SALARY COST PER STUDENT CREDIT HOUR<sup>1</sup> BY TYPE OF INSTITUTION  
AND CIP CLASSIFICATION  
1984-85

CIP classification	State-related				State-owned			
	Undergraduate			Master's	Undergraduate			Master's
	Total under- graduate level	Lower division	Upper division		Total under- graduate level	Lower division	Upper division	
Agriculture	\$55	\$48	\$58	\$159	--	--	--	--
Architecture and environmental design	50	58	47	149	\$43	--	\$43	\$196
Area and ethnic studies	67	47	87	105	--	--	--	--
Business	34	29	37	59	34	\$29	38	79
Communications	39	24	49	152	46	37	57	122
Computer and information sciences	36	33	44	59	42	39	55	100
Education	52	36	71	74	67	50	84	94
Engineering	46	50	43	114	83	65	99	185
Foreign languages	45	37	75	181	63	54	139	111
Health	62	56	64	285	94	89	96	190
Home economics	33	22	53	151	55	40	68	163
Industrial arts	--	--	--	--	81	71	96	355
Law	16	15	16	45	--	--	--	--
Letters	37	34	47	121	50	46	90	170
Liberal/general studies	50	27	100	--	7	6	22	--
Library and archival sciences	39	24	71	88	61	57	65	88
Life sciences	30	23	52	191	55	42	117	299
Mathematics	32	29	51	122	41	37	70	108
Military sciences	--	--	--	--	--	--	--	--
Multi/interdisciplinary studies	41	36	60	155	35	31	68	57
Parks and recreation	68	43	74	165	58	45	72	245
Personal and social development	--	--	--	--	--	--	--	--
Philosophy, religion and theology	38	33	58	171	40	36	91	789
Physical sciences	34	30	56	161	65	52	164	225
Psychology	26	17	53	173	42	34	66	92
Public affairs and protective services	49	34	56	93	49	36	69	76
Social sciences	35	27	53	166	42	35	75	155
Trade and industrial	57	57	112	--	77	52	83	--
Visual and performing arts	44	31	75	164	63	50	125	261
Other	36	28	49	163	45	41	30	--
<b>Total</b>	<b>39</b>	<b>31</b>	<b>51</b>	<b>112</b>	<b>51</b>	<b>42</b>	<b>74</b>	<b>113</b>

1. The instructional faculty salary cost per student credit hour for each level was calculated as follows: the instructional salary for each rank was assigned by level according to the percentage distribution of the course (assigned) credits within each rank. The salary determined by this method for each rank was summed by level and divided by the total student credit-hour production at that level. In the case of individual instruction, one course credit was attributed to every three student credit hours produced in individual instruction.

SOURCE: Reports provided by the individual institutions, 1985.

classes are typically larger in size than master's classes (table 11). Table 11 shows that average class size tends to vary directly with the quantity of SCH produced at every academic level.

#### Number of Classes (Sections) per Course

Administrators can change the number of classes (sections) per course as an alternative to permitting changes in class size to occur. The number of classes per course tends to vary inversely with academic level, and positively with the quantity of SCH produced at each academic level (table 12).

#### QUANTITATIVE ANALYSIS OF COST EFFICIENCY

The specification of the SCH cost model can be statistically validated, and estimates of the quantitative values of the various control variables made, using the technique of multiple regression analysis. The regression equation which results from the SCH cost model given in the appendix is:<sup>20</sup>

$$\ln Y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2$$

where:

Y = instructional salary cost per student credit hour (\$)

X<sub>1</sub> = average PTE instructional faculty salary (\$)

X<sub>2</sub> = average class (section) size (persons)

b<sub>0</sub>, b<sub>1</sub> and b<sub>2</sub> are regression coefficients to be estimated; ln is natural log.

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<sup>20</sup>This regression equation is a logarithmic transformation of a multiplicative version of the SCH cost equation given in the appendix. Notice that the regression equation does not include the number of classes (sections) per course as an explanatory variable. Variations in the number of classes per course and average class (section) size are alternative policy actions. Inclusion of both variables in the regression would be both conceptually and statistically incorrect.

Table II  
 AVERAGE CLASS SIZE IN CLASSROOM INSTRUCTION BY LEVEL<sup>1</sup>  
 TOTAL YEAR 1984-85  
 PERCENTAGE CHANGE 1983-84 to 1984-85

Institution <sup>2</sup>	Undergraduate level									Master's		
	Total undergraduate			Lower division			Upper division			Class size	One-year change	Percentage change
	Class size	One-year change	Percentage change	Class size	One-year change	Percentage change	Class size	One-year change	Percentage change			
<b>State-related</b>												
Penn State	29	-1	-3%	29	-1	-3%	30	0	0	12	1	9%
Pittsburgh	27	0	0	29	0	0	23	-1	-4%	16	-1	-6
Temple	23	-1	-4	25	-1	-4	21	-1	-5	13	0	0
Lincoln	15	-1	-6	18	0	0	9	-1	-10	11	-1	-8
Total	27	1	-4	28	-1	-3	25	-1	-4	14	0	0
<b>State-owned</b>												
Indiana	24	-1	-4	30	-1	-3	17	0	0	7	-1	-12
West Chester	21	0	0	24	-1	-4	15	0	0	10	0	0
Millersville	22	-1	-4	26	-1	-4	14	0	0	12	1	9
Bloomsburg	23	0	0	26	0	0	19	1	6	13	2	18
Shippery Rock	24	0	0	30	0	0	15	0	0	11	0	0
Edinboro	22	0	0	25	0	0	16	0	0	8	0	0
Clarion	29	1	4	33	-1	-3	20	2	11	12	3	33
Shippensburg	25	0	0	28	1	4	21	0	0	14	1	8
Kutztown	21	-4	-16	27	-6	-18	13	-4	-24	10	-1	-9
California	24	0	0	28	0	0	16	0	0	9	1	12
East Stroudsburg	24	0	0	28	-1	-3	17	0	0	14	-1	-7
Mansfield	18	-1	-5	25	-2	-7	10	0	0	7	0	0
Lock Haven	23	0	0	27	1	4	18	2	12	na	na	na
Cheyney	15	-4	-21	17	-5	-23	10	-2	-17	8	0	0
Total	23	0	0	27	-1	-4	16	0	0	10	0	0
All institutions	25	-1	-4	28	-1	-3	21	0	0	12	0	0

1. Average class size for each level is calculated by dividing total classroom student credit hours by total classroom assigned credits.

2. Arranged in descending order with respect to total full-time equivalent students for 1984-85.

na. Not applicable.

SOURCE: Reports provided by the Individual Institutions, 1984 and 1985.

Table 12

AVERAGE NUMBER OF SECTIONS PER UNDERGRADUATE COURSE<sup>1</sup>  
1984-85 AND CHANGE FROM 1983-84

Institution <sup>2</sup>	Undergraduate			
	Lower division	Percentage change	Upper division	Percentage change
State-related				
Penn State	7.24	-6%	1.74	0
Pittsburgh	2.71	1	1.42	1%
Temple	1.77	28	2.61	27
Lincoln	1.54	2	1.21	25
Total	3.57	5	1.82	6
State-owned				
Indiana	3.07	2	1.63	-1
West Chester	1.97	5	1.37	1
Millersville	2.31	2	1.52	-19
Bloomsburg	2.17	-8	1.55	0
Slippery Rock	2.03	-2	1.48	-2
Edinboro	2.34	1	1.48	-2
Clarion	1.85	3	1.34	2
Shippensburg	2.50	-2	1.43	3
Kutztown	2.41	-9	1.56	-9
California	1.94	2	1.49	5
East Stroudsburg	1.51	1	1.29	8
Mansfield	1.49	1	1.57	1
Lock Haven	1.77	-3	1.31	2
Cheyney	2.22	6	1.31	12
Total	2.14	a	1.48	-1
All institutions	2.70	3	1.63	3

1. Average sections per undergraduate course are computed as: total classroom course credit hours divided by three equals number of sections; number of sections divided by total number of courses equals average sections per course.

2. Arranged in descending order with respect to total full-time equivalent students for 1984-85.

a. Rounds to less than 1 percent.

SOURCE: Reports provided by the individual institutions, 1984 and 1985.

This regression equation was estimated for the State-related and State-owned universities as separate groups, using data for the 1984-85 school year. The coefficient estimates obtained from the regression are as follows:<sup>21</sup>

Variable	Coefficient estimates			
	State-related universities		State-owned universities	
	Lower division	Upper division	Lower division	Upper division
ln constant	-3.78	-3.70	-5.45	-2.72
ln X <sub>1</sub>	.97	.97	1.16	.92
ln X <sub>2</sub>	-.74	-.67	-.82	-.84

The SCH cost model is supported in several ways by these empirical results. All of the coefficients for the control variables are statistically significant at the 5 percent level or better. The coefficients have the expected signs: SCH cost is positively correlated with average faculty salary, and negatively correlated with average class size. Finally, the model has substantial explanatory power: the regressions explain from 59 to 78 percent of the variation in SCH cost, depending on the type of public university and academic level.

The quantitative values of the coefficients indicate, for example, that in the lower division of the State-owned universities, a 1 percent increase in the average salary of the FTE instructional faculty could be expected to increase SCH cost by 1.16 percent, and a 1 percent increase in average class (section) size could be expected to decrease SCH cost by about .82 percent, with all other factors held constant. The other regression coefficients have similar interpretations. For a given percentage change in either salary or class size, the percentage impact on SCH cost could be expected to be greater in the smaller State-owned universities than the larger State-related universities.

The overall cost reductions which could be expected to result from given changes in the control variables, holding all other factors constant, are as follows:

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<sup>21</sup>The regression uses data for the various program areas, for the lower and upper divisions, for the various institutions. Regression observations are not included in this report. These and all other regression details are available from the Joint State Government Commission.

<u>Policy action</u>	<u>State-related universities</u> <u>(\$000)</u>		<u>State-owned universities</u> <u>(\$000)</u>		<u>Total</u>
	<u>Lower division</u>	<u>Upper division</u>	<u>Lower division</u>	<u>Upper division</u>	
Decrease average faculty salary by \$1,000	\$2,700	\$2,400	\$2,900	\$1,700	\$9,700
Increase class (section) sizes by one student	1,700	2,100	2,200	3,200	9,200

#### COST-EFFICIENCY TRENDS

Between 1980-81 and 1984-85, average undergraduate instructional faculty salary cost per student credit hour increased to \$38 from \$32 (19 percent) at Pittsburgh, to \$44 from \$41 (7 percent) at Temple, and to \$53 from \$46 (15 percent) at Lincoln. For the State-owned universities as a group, average SCH cost increased to \$50 from \$44 (14 percent).<sup>22</sup>

During the same time, at the State-related institutions (excluding Penn State), average instructional faculty salary increased by 26 percent, while average class size remained nearly unchanged. At the State-owned institutions, average instructional faculty salary increased by 17 percent, and average class size by 4 percent. During this period, the growth rates of average instructional faculty salary minus average class size largely explain the growth rates of SCH cost.

#### STATEWIDE COMPARISONS OF TOTAL INSTRUCTIONAL COST PER FTE STUDENT IN PUBLIC INSTITUTIONS OF HIGHER EDUCATION

In fiscal year 1983 the total instructional cost per FTE student in Pennsylvania's public universities and community

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<sup>22</sup>The cost increase excludes Cheyney; no data were available for 1980-81.

colleges was \$5,303 (table 13). The comparable U.S. average student cost was \$4,641; 20 states had a cost which exceeded the U.S. average. Pennsylvania's public institution student cost was 14 percent higher than the U.S. average and the sixth highest in the nation.

For comparisons of public institutions across states, the following regression model of student cost is postulated:<sup>23</sup>

$$\ln Y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3$$

where:

Y = total instructional cost per FTE student (\$)

X<sub>1</sub> = average full-time ranked instructional faculty salary (\$)

X<sub>2</sub> = average FTE student enrollment per institution (persons)

X<sub>3</sub> = State government appropriations per State population (\$)

b<sub>0</sub>, b<sub>1</sub>, b<sub>2</sub> and b<sub>3</sub> are regression coefficients to be estimated; ln is natural log.

This regression was estimated for the 50 states, using data for fiscal year 1983. The coefficient estimates obtained are as follows:<sup>24</sup>

<u>Variable</u>	<u>Coefficient estimate</u>
ln constant	3.96
ln X <sub>1</sub>	.49
ln X <sub>2</sub>	-.15
ln X <sub>3</sub>	.16

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<sup>23</sup>In this regression model, average FTE enrollment per institution (campus) is the size (scale) variable. If FTE enrollment and average class size tend to be positively correlated within individual institutions, then this model of student cost is nearly equivalent to the model of SCH cost developed above.

<sup>24</sup>This regression uses data at the State level. Regression observations are not included in this report. These and all other regression details are available from the Joint State Government Commission.



Table 13

TOTAL INSTRUCTIONAL COST<sup>1</sup> PER FTE STUDENT  
ALL PUBLICLY CONTROLLED INSTITUTIONS OF HIGHER EDUCATION  
FISCAL YEAR 1983

State	Rank	Instructional cost per FTE student
Alaska	1	\$9,726
Wyoming	2	6,987
Vermont	3	6,229
New York	4	5,980
Delaware	5	5,701
PENNSYLVANIA	6	5,303
Iowa	7	5,265
Kentucky	8	5,091
Rhode Island	9	5,054
Wisconsin	10	5,025
North Dakota	11	4,985
Utah	12	4,950
Maine	13	4,924
Texas	14	4,881
Maryland	15	4,866
Indiana	16	4,799
Michigan	17	4,792
Oregon	18	4,685
Tennessee	19	4,682
South Carolina	20	4,661
Idaho	21	4,621
Ohio	22	4,612
Washington	23	4,584
Arkansas	24	4,565
Minnesota	25	4,563
New Jersey	26	4,559
Kansas	27	4,546
Colorado	28	4,511
Mississippi	29	4,501
Hawaii	30	4,449
North Carolina	31	4,422
California	32	4,409
Florida	33	4,373
Montana	34	4,360
New Mexico	35	4,342
Virginia	36	4,307
Nebraska	37	4,301
Alabama	38	4,298
Arizona	39	4,247
Georgia	40	4,223
Louisiana	41	4,122
South Dakota	42	4,108
Missouri	43	4,073
New Hampshire	44	4,070
West Virginia	45	4,014
Connecticut	46	3,978
Nevada	47	3,975
Illinois	48	3,974
Oklahoma	49	3,944
Massachusetts	50	3,744
U.S. average		4,641

1. Instructional costs for each state include instruction, student services, and scholarships and fellowships, plus a portion of academic support, instructional support, plant operation and mandatory; the latter costs are allocated to instruction on the basis of the ratio of each state's direct instructional costs to its total costs, where total costs equal the direct instructional costs plus noninstructional public service and research.

SOURCE: FTE Students - National Center for Education Statistics, worksheets (Washington, D.C.: June 1984); Instructional Costs - National Center for Education Statistics, worksheets (Washington, D.C.: November 1985).

Interstate differences in student cost in the public institutions are substantially explained by these empirical results. All of the coefficients are statistically significant at the 5 percent level or better, and have the expected signs: student cost in the public institutions is positively correlated with both average full-time ranked instructional faculty salary and average public support for higher education, and negatively correlated with average institutional (per campus) FTE student enrollment. The regression explains about 46 percent of the variation in student cost in the public institutions of higher education across the states.

The relatively high student cost in Pennsylvania's public institutions of higher education would appear to be largely explained by two of the three causal variables in the model: average instructional faculty salary is about 5 percent higher, and average FTE student enrollment per institution about 8 percent lower, than the 50 states' average for these same variables.

## V. Cost Sharing

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For the most part, instructional costs in Pennsylvania's public universities are covered by student tuition and fees plus direct appropriations from the Commonwealth's General Fund Budget. Of course, tuition and fees are not necessarily borne totally by students; students receive financial assistance from many sources. The Commonwealth gives financial aid to students at the public universities in several forms: grants under the State Higher Education Grant Program; interest-subsidized and payment-guaranteed loans from private lenders under the State Guaranteed Student Loan and PLUS programs; and loans or employment from institutions of higher education under State Matching Funds programs. These programs, administered by the Pennsylvania Higher Education Assistance Agency (PHEAA), are also funded primarily by General Fund appropriations. Properly computed student and public shares of the cost of instruction at the public universities must consider all of these factors.

### STUDENT TUITION AND FEES

Tuition and required fees for students at the State-related universities are determined by the individual institutions. Tuition for students at the State-owned universities is set by the State System of Higher Education; required fees are set by the individual institutions. For the 1984-85 academic year, in-State student charges for the State-related universities ranged from \$1,830 (Lincoln) to \$2,940 (Temple) for undergraduates and from \$2,325 to \$3,242 (same institutions) for graduates. For the State-owned universities, in-State undergraduate charges ranged from \$1,675 (Lock Haven) to \$1,830 (California) and in-State graduate charges from \$1,570 (Kutztown) to \$1,766 (Slippery Rock) (table 14). At Penn State and Pittsburgh, average tuition and fees for nonresident students exceeded those for residents by approximately 100 percent. At Temple, the out-of-state premium was 75 percent for undergraduates and 25 percent for graduates. At Lincoln, the

Table 14

ACADEMIC YEAR TUITION AND REQUIRED FEES<sup>1</sup> BY LEVEL  
MAIN CAMPUSES OF SELECTED PUBLIC AND PRIVATE INSTITUTIONS  
1984-85

Group	Institution	Undergraduate level			Graduate level		
		PUBLIC			PUBLIC		
		In-state	Out-of-state	Private	In-state	Out-of-state	Private
<b>I. INSTITUTIONS AWARDING ONLY BACHELOR'S DEGREES</b>							
	State-owned (Pennsylvania)						
	Lock Haven	\$1,675	\$2,853		--	--	
	Private (Pennsylvania)						
	Dickinson College			\$8,323			--
	Franklin & Marshall College			8,160			--
	Gettysburg College			7,740			--
	Lebanon Valley College			6,050			--
	Swarthmore College			9,175			--
	Wilson College			6,676			--
	Public (other states)						
	Mary Washington College (VA)	1,326	2,896		--	--	
	University of N.C. at Asheville (NC)	712	2,962		--	--	
<b>II. INSTITUTIONS AWARDING BACHELOR'S AND ADVANCED DEGREES</b>							
	State-related and State-owned						
	Penn State	2,562	5,146		\$2,730	\$5,458	
	Pittsburgh	2,758	5,408		3,240	6,410	
	Temple	2,940	5,124		3,242	4,058	
	Lincoln	1,830	2,830		2,325	4,025	
	Bloomsburg	1,714	2,892		1,624	1,714	
	California	1,830	3,008		1,752	1,842	
	Cheyney	1,730	2,908		1,710	1,800	
	Clarion	1,758	2,936		1,710	1,800	
	East Stroudsburg	1,744	2,922		1,688	1,778	
	Edinboro	1,758	2,936		1,758	1,848	
	Indiana	1,778	2,956		1,710	1,800	
	Kutztown	1,708	2,886		1,570	1,660	
	Mansfield	1,755	2,933		1,650	1,740	
	Millersville	1,686	2,864		1,590	1,680	
	Shippensburg	1,782	2,960		1,690	1,780	
	Slippery Rock	1,766	2,944		1,766	1,856	
	West Chester	1,694	2,872		1,694	1,784	
	Private (Pennsylvania)						
	Bryn Mawr College			9,010			\$8,475
	Carnegie-Mellon University			8,450			9,130
	Lehigh University			8,750			8,750
	University of Pennsylvania			9,600			10,160
	Public (other states)						
	Eastern New Mexico U.-Main (NM)	752	2,308		752	2,308	
	Lake Superior St. College (MI)	1,455	2,760		2,160	2,160	
	Rutgers University-Camden (NJ)	1,776	3,296		2,356	3,308	
	SUNY at Stony Brook (NY)	1,455	3,305		2,325	3,900	
	University of Maryland at College Park (MD)	1,410	3,962		2,032	3,544	
	University of Michigan at Ann Arbor (MI)	2,172	6,732		3,416	7,332	
	University of North Carolina at Chapel Hill (NC)	765	3,125		773	3,393	
	University of Texas at Austin (TX)	475	1,555		484	1,311	

1. In instances where charges are on a per course basis, undergraduate tuitions are determined on a 30 credit-hour, academic-year workload and graduate tuitions on a 24 credit-hour, academic-year workload.

SOURCE: Pennsylvania Department of Education, "Undergraduate and Graduate Tuition and Required Fees at Institutions of Higher Education for the 1984-85 Academic Year" and data furnished by individual institutions.

out-of-state premiums for the two academic levels were 55 and 73 percent, respectively. At the State-owned institutions, out-of-state undergraduate students paid about two-thirds more, but out-of-state graduate students only 5 percent more, than their in-State counterparts. From 1983-84 to 1984-85, average undergraduate student charges for Pennsylvania residents increased by 6.5 percent at the State-related universities and by 5.8 percent at the State-owned universities; increases for nonresidents were similar in magnitude to those for residents at both types of institutions.

Table 14 also shows comparable student charges for selected private colleges and universities in Pennsylvania and selected public institutions in other states.<sup>25</sup> Considering those institutions included in this selection, in-State student charges for Pennsylvania's public universities were much lower than student charges for private institutions in the Commonwealth. Student charges at Pennsylvania public institutions were typically much higher than at public institutions in other states.

#### COMMONWEALTH APPROPRIATIONS

##### Direct Appropriations to the Public Universities

For fiscal year 1985 the Commonwealth's General Fund appropriations to the public universities for educational and general purposes totaled approximately \$543 million: \$295 million (54 percent) was appropriated to the State-related universities, and \$248 million (46 percent) to the State System of Higher Education for allocation to the State-owned universities.<sup>26</sup> Table 15 shows that the direct appropriations represent total increases of 8 percent for both types of institutions over fiscal year 1984. For the most part, appropriations per FTE student vary inversely with FTE student enrollments.

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<sup>25</sup>The selection of institutions in table 14 is the same selection as was made for table 8.

<sup>26</sup>Note that the State System of Higher Education appropriation excludes amounts for both the Board of Governors/Chancellor's Office and the System Reserve.

Table 15

STATE APPROPRIATIONS FOR INSTRUCTION RELATED TO TUITION AND FEE REVENUES AND FTE STUDENTS<sup>1</sup>  
 1984-85, CHANGE FROM 1983-84 AND FIVE-YEAR AVERAGE ANNUAL RATE OF CHANGE  
 (1979-80 to 1984-85)

Institution <sup>2</sup>	Appropriation			Appropriation as percentage of total revenues from tuition, fees and appropriation	Appropriation per FTE student			
	Amount (millions)	Percentage change			Amount	One-year change	Percentage change	
		One year	Five-year annual average			One year	Five-year annual average	
<b>State-related</b>								
Penn State	\$118.6	7%	6%	41%	\$2,070	\$170	9%	5%
Pittsburgh <sup>3</sup>	81.5	7	6	44	2,780	190	7	5
Temple	89.0	10	7	51	3,710	220	6	9
Lincoln <sup>4</sup>	5.5	20	10	64	4,480	970	28	14
Total	294.5	8	6	45	2,640	210	9	6
<b>State-owned</b>								
Indiana	35.2	10	9	64	2,740	260	11	8
West Chester	25.1	10	5	64	3,040	320	12	5
Millersville	18.9	9	8	65	3,060	280	10	5
Bloomsburg	19.2	7	8	66	3,100	220	8	8
Slippery Rock	17.9	10	4	63	2,910	160	6	2
Edinboro	17.8	7	2	67	3,100	190	7	1
Clarion	17.3	6	5	65	3,020	110	4	3
Shippensburg	17.4	6	6	66	3,100	100	3	5
Kutztown	16.8	9	7	64	2,990	200	7	2
California	15.9	5	2	69	3,370	120	4	-1
East Stroudsburg	14.2	6	6	66	3,330	120	4	5
Mansfield	11.0	5	2	70	3,900	100	3	a
Lock Haven	10.6	6	5	71	3,980	100	3	3
Cheyney	11.3	5	4	78	6,400	1,040	19	12
Total <sup>5</sup>	248.5	8	5	66	3,160	210	7	4
All Institutions <sup>5</sup>	543.0	8	6	53	2,850	210	8	5

1. Appropriations include only funding for educational and general purposes.
2. Arranged in descending order with respect to total full-time equivalent students for 1984-85.
3. Includes appropriation for Titusville campus.
4. Includes appropriation for human services.
5. Excludes amount of appropriation allocated to Board of Governors/Chancellor's Office and System Reserve.
- a. Rounds to less than 1 percent.

SOURCE: Reports provided by the individual institutions, 1980 to 1985; Governor's Executive Budget, 1985-86; data furnished by the State System of Higher Education, Commonwealth of Pennsylvania, August and December 1985.

Appropriations to PHEAA for  
Financial Aid to Public University Students<sup>27</sup>

The fiscal year 1985 Commonwealth appropriation from the General Fund to the Pennsylvania Higher Education Assistance Agency totaled over \$110 million; of this, about \$33 million, or approximately 30 percent, was used by PHEAA for various financial-aid programs for students enrolled in the public universities. The fiscal year 1985 financial aid from PHEAA to the public universities and their students represented an increase of 9 percent over fiscal year 1984.

During academic year 1984-85, the Pennsylvania Higher Education Assistance Agency awarded nearly \$21 million (average full-year award \$860) to 25,948 undergraduates (31 percent of the fall undergraduate enrollment) at the State-related universities, and over \$11 million (average award \$593) to 20,533 undergraduates (29 percent of the fall undergraduate enrollment) at the State-owned universities, under the State Higher Education Grant Program. The awards to State-related university students amounted to a little over 25 percent and to State-owned university students about 14 percent of the total value of the grants made to students in all institutions of higher education in Pennsylvania under this grant program. These awards need not be repaid to PHEAA.

During academic year 1984-85 PHEAA disbursed State funds as allocations to institutions and aid to students in the total amounts of \$607,600 to the State-related universities and \$1,070,800 to the State-owned universities under the State Matching Fund Program. These funds were used by the institutions for National Direct Student Loans, nursing student loans, and as matching funds for various work-study programs, internships, etc.

In the same year PHEAA administered low-interest and federally guaranteed loans by private lenders to 48,144 State-related university undergraduate and graduate students (average loan value \$2,355) and 36,065 State-owned university undergraduate and graduate students (average loan value \$1,847), under the State Guaranteed Student Loan Program. The guaranteed loans to the State-related university students represented about 24 percent and to the State-owned university students about 14 percent of the total value of the guaranteed loans to students in all institutions of higher education in Pennsylvania under this program. In addition, PHEAA administered guaranteed loans to 2,220

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<sup>27</sup>Pennsylvania Higher Education Assistance Agency, Year-By-Year Summary Statistics [for various PHEAA programs], April 1985.

State-related university students (average loan value \$2,472) and 1,751 State-owned university students (average loan value \$2,004) under its PLUS loan program. Under both programs the federal government reimburses lenders for the difference between market rates of interest and the lower rates charged to students, and covers student loan defaults.

#### COST-SHARING TRENDS

Between 1979-80 and 1984-85, average tuition and fees for an FTE student enrolled in the State-related universities increased by 16.1 percent per year, and in the State-owned universities by 12.1 percent per year. Table 16 shows that over the same interval, the average direct Commonwealth appropriation per FTE student enrolled in the State-related institutions increased by 6 percent per year, and in the State-owned institutions by 4 percent per year. Not considering Commonwealth financial assistance through the various PHEAA programs, the average student share of instructional revenue to the institutions (tuition and fees plus direct appropriations) increased by 8 percent at the State-related universities and by 6 percent at the State-owned universities.

Over the same interval, PHEAA made annual grants to about 30 to 35 percent of the full-time undergraduates at the State-related universities and to about 30 percent of these students at the State-owned universities. The average full-year grant amount per student increased to \$860 from \$532 (62 percent), and to \$593 from \$344 (72 percent), respectively, at the two groups of schools. The percentage of total student charges covered by PHEAA grants (tuition, fees, room and board, etc.) increased to almost 17 percent from between 15 and 16 percent over this five-year period.<sup>28</sup>

During the five-year period, PHEAA administered guaranteed loans by private lenders (under its largest loan guarantee program) to nearly 46 percent of the FTE students at the State-related universities and nearly 50 percent of these students at the State-owned universities. The average loan guarantee amount per FTE student under this program increased to \$2,355 from \$2,110 (12 percent), and to \$1,847 from \$1,628 (13 percent), respectively, at the two groups of institutions.<sup>29</sup>

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<sup>28</sup>Ibid.

<sup>29</sup>Ibid.



Table 16

TUITION AND FEES AND STATE APPROPRIATION PER FULL-TIME STUDENT<sup>1</sup>  
 STATE-RELATED AND STATE-OWNED<sup>2</sup> UNIVERSITIES  
 (1979-80 to 1984-85)

Year	Per State-related FTE student				Per State-owned FTE student			
	Tuition and fees	Appropriation	Total revenue	Appropriation as a percentage of revenue	Tuition and fees	Appropriation	Total revenue	Appropriation as a percentage of revenue
1984-85	\$3,210	\$2,640	\$5,850	45%	\$1,620	\$3,160	\$4,780	66%
1983-84	2,920	2,430	5,350	45	1,540	2,950	4,490	66
1982-83	2,610	2,330	4,940	47	1,540	3,000	4,540	66
1981-82	2,210	2,180	4,390	50	1,300	2,850	4,150	69
1980-81	2,000	2,100	4,100	51	1,130	2,760	3,890	71
1979-80	1,780	2,030	3,810	53	1,010	2,630	3,640	72
Average annual increase	16.1%	6.0%	11.0%		12.1%	4.0%	6.3%	

1. FTE students include in-state and out-of-state undergraduate and graduate students. Tuition and fees are based on revenues collected by the individual institutions. State appropriations include only funding for educational and general purposes.

2. Excludes amount of appropriations allocated to Board of Governors/Chancellor's Office and System Reserve.

SOURCE: State-related tuition and fee data provided by the individual institutions, 1980 to 1985; State-owned tuition and fee data furnished by Pennsylvania Department of Education, Bureau of Budget and Management, 1980 to 1983; the State System of Higher Education, Commonwealth of Pennsylvania, 1984 and 1985; and Governor's Executive Budget, 1985-86, 1984-85, 1983-84, 1982-83 and 1981-82.

Clearly, even after consideration of Commonwealth financial assistance through PHEAA, the student share of public higher education costs in Pennsylvania has risen. In addition, student loans have increased dramatically.

#### INTERSTATE COMPARISON OF COST SHARING

During fiscal year 1985, the average tuition at a public institution of higher education in Pennsylvania was \$2,009 per FTE student, nearly double the U.S. average (table 17).<sup>30</sup> In 28 states the average tuition was higher than the U.S. average. In only four states was the average tuition higher than in Pennsylvania.

On the other hand, table 17 shows that, in fiscal 1985, total Commonwealth and local appropriations to all public institutions amounted to \$3,287 per FTE student, only slightly less than the U.S. average. Twenty states made appropriations to public higher education which exceeded the U.S. average on an FTE student basis. Pennsylvania's per FTE student public support was the 24th highest in the nation.

On a per student basis, appropriations in Pennsylvania to public higher education are about equal to, and total instructional costs much higher than, the national average; therefore, higher tuition is required to make up the difference. As demonstrated previously, one of the factors contributing to Pennsylvania's higher instructional cost is the small average enrollment at public higher education institutions. At least a part of the higher student share can be viewed as the price that is paid for the convenience and economy to students of the availability of many geographically diverse public campuses in Pennsylvania.

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<sup>30</sup>Kent Halstead, How States Compare in Financing Higher Education, 1984-85 (Washington, D.C.: National Institute of Education, May 1985). Table 17 includes tuition (estimated) and appropriations for four-year public colleges and universities, two-year public colleges, publicly supported medical schools and research institutions; some appropriations are not related to student enrollments. For Pennsylvania, the data in table 17 differ from the data in tables 15 and 16; the latter data include only tuition and Commonwealth appropriations for educational and general purposes per FTE student for the public universities, excluding medical schools.

Table 17

TUITION AND APPROPRIATIONS PER FTE STUDENT  
ALL PUBLIC INSTITUTIONS OF HIGHER EDUCATION  
FISCAL YEAR 1985

State	Per FTE student			Percentage of appropriations to total
	Estimated average tuition <sup>1</sup>	State & local appropriations <sup>2</sup>	Total	
Alabama	\$1,158	\$3,541	\$4,699	75.4%
Alaska	1,099	10,584	11,683	90.6
Arizona	956	3,120	4,076	76.5
Arkansas	1,001	3,660	4,661	78.5
California	500	3,885	4,385	88.6
Colorado	1,622	2,424	4,046	59.9
Connecticut	1,197	3,314	4,511	73.5
Delaware	2,335	3,607	5,942	60.7
Florida	734	3,197	3,931	81.3
Georgia	1,075	3,710	4,785	77.5
Hawaii	843	6,055	6,898	87.8
Idaho	655	3,705	4,360	85.0
Illinois	923	2,899	3,822	75.9
Indiana	1,571	3,054	4,625	66.0
Iowa	1,398	3,352	4,750	70.6
Kansas	923	3,173	4,096	77.5
Kentucky	1,105	3,305	4,410	74.9
Louisiana	903	3,159	4,062	77.8
Maine	1,499	3,186	4,685	68.0
Maryland	1,294	3,033	4,327	70.1
Massachusetts	902	4,034	4,936	81.7
Michigan	1,681	2,994	4,675	64.0
Minnesota	1,169	3,553	4,722	75.2
Mississippi	991	2,611	3,602	72.5
Missouri	1,178	2,959	4,137	71.5
Montana	820	3,841	4,661	82.4
Nebraska	1,006	2,646	3,652	72.5
Nevada	1,098	3,058	4,156	73.6
New Hampshire	2,836	1,856	4,692	39.6
New Jersey	1,374	4,051	5,425	74.7
New Mexico	590	4,111	4,701	87.4
New York	952	5,008	5,960	84.0
North Carolina	507	3,207	3,714	86.3
North Dakota	1,039	2,801	3,840	72.9
Ohio	2,049	2,857	4,906	58.2
Oklahoma	650	2,839	3,489	81.4
Oregon	1,203	3,082	4,285	71.9
PENNSYLVANIA	2,009	3,287	5,296	62.1
Rhode Island	1,425	3,845	5,270	73.0
South Carolina	1,464	4,202	5,666	74.2
South Dakota	1,065	2,084	3,149	66.2
Tennessee	1,081	3,476	4,557	76.3
Texas	580	3,498	4,078	85.8
Utah	948	3,617	4,565	79.2
Vermont	3,545	1,905	5,450	35.0
Virginia	1,246	3,046	4,292	71.0
Washington	887	3,286	4,173	78.7
West Virginia	1,060	2,557	3,617	70.7
Wisconsin	1,226	3,220	4,446	72.4
Wyoming	627	5,195	5,822	89.2
U.S. average <sup>3</sup>	1,055	3,467	4,522	76.7

1. Tuition revenues for fiscal year 1985 were estimated by the U.S. Department of Education.

2. State and local appropriations for current operating expenses of all publicly supported institutions, including two-year colleges, four-year colleges and universities, and research institutions.

3. U.S. average also includes the District of Columbia, not separately shown.

SOURCE: Kent Halstead, How States Compare in Financing Higher Education 1984-85 (Washington, D.C.: National Institute of Education, May 1985).



## Appendix: A Model of SCH Cost Determination

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Average instructional faculty salary cost per student credit hour, or SCH cost, at each academic level and in each program area can be expressed by the following model:

$$\frac{\text{Instructional FTE faculty salaries}}{\text{Student credit hours}} = \left\{ \frac{\text{Number of FTE instructional faculty}}{\text{Number of courses}} \times \text{Average course credit value} \right\} \times \left\{ \frac{\text{Average FTE instructional faculty salary}}{\text{Number of classes}} \times \frac{\text{Average class size}}{\text{Number of courses}} \right\}$$

The two terms on the right-hand side of this equation illustrate the two different kinds of factors which determine SCH cost.

The components of the first term are approximately constants or constant relationships. The number of FTE faculty per course is approximately 0.8 in the State-related universities and approximately 0.5 in the State-owned universities. The average assigned credit per course is very close to three in both types of institutions. In the short run, these components cannot readily be varied by university administrators to influence SCH cost.

The second term in the equation contains control variables: average instructional faculty salary, average class (section) size, and the number of classes (sections) per course. To at least some degree, each of these variables can be controlled by administrators to affect SCH cost. Adjustments in the number of classes (sections) per course are an alternative to permitting average class size to change with changes in enrollment.

This model is the basis for the multiple regression analysis of SCH cost in the text (see p. 35).

