Volume Title: Buying the Best: Cost Escalation in Elite Higher Education

Volume Author/Editor: Charles T. Clotfelter

Volume Publisher: Princeton University Press

Volume ISBN: 0-691-02642-4

Volume URL: http://www.nber.org/books/clot96-1

Conference Date: n/a

Publication Date: January 1996

Chapter Title: The Allocation of Faculty Effort

Chapter Author: Charles T. Clotfelter

Chapter URL: http://www.nber.org/chapters/c11282

Chapter pages in book: (p. 179 - 217)

CHAPTER 7

The Allocation of Faculty Effort

> Writing is 'our work,' which we do alone. Teaching is our 'load,' which we also do alone, up there in front of the class. . . . And committee work is the dues we grudgingly pay so that we can continue to read and write for a living.
>
> *Jane Tomkins, 1992*[1]

THE UNIVERSITY'S central and most distinctive activities—teaching, research, and public service—are carried out largely by its most distinctive set of employees: the faculty. As a consequence, the decisions about how to allocate faculty effort are basic to the functioning of colleges and universities, and to their cost. Although most day-to-day decisions concerning these activities are entirely in the hands of departments and faculty members themselves, the larger decisions of resource allocation related to these functions, such as who will teach undergraduates, what courses will be offered, and how large classes will be, are influenced strongly by deans and other officers in the central administration. As noted in chapter 2, the governance of private colleges and universities is neither hierarchical nor entirely decentralized. Whatever the precise locus of power, however, these institutions face alternatives about resource allocation, they make choices, and those choices have educational consequences. Perhaps the most striking fact about contemporary American colleges and universities—even among institutions that compete for the very same groups of applicants and face virtually identical input prices—is that they do not all make the same decisions about these basic resource allocation questions. Among the private institutions competing for the most sought-after high school seniors, for example, are marked differences in the use of graduate students in undergraduate course instruction and in the average size of undergraduate classes.

Given the importance of faculty compensation in arts and sciences budgets, the choice of approach has profound implications for the cost structure of these institutions. It is for this reason that an increase in emphasis on research, accompanied by a trend toward reduced teaching loads, pushes up total costs. Massy and Wilger (1992, p. 367) describe this trend impressionistically:

> The American professorate has undergone an evolution since World War II. No longer do faculty members devote the majority of their time to teaching and related activities such as academic advising and mentoring. Rather, the primary focus of faculty effort increasingly is research, scholarship, and other professional activity.

They argue that this shift has been most pronounced in the "elite research institutions," where heavy demand by applicants has allowed institutions to determine the "output mix," and that other institutions have emulated the elite institutions in this regard. If these changes in faculty teaching loads have in fact occurred, they would imply changes in institutions' choices about the technique of undergraduate teaching, with implications not only for costs but also, possibly, for the quality of undergraduate education. It is therefore important to give explicit consideration to these allocation choices. However, as Massy and Wilger note, hard evidence documenting these changes is not plentiful.[2]

This chapter and the next focus on the central resource allocation choices open to universities—choices about how universities will employ the faculty in arts and sciences—and the consequences of those choices for students. The reader will observe quickly that most of the attention is directed toward the activity that can be measured most readily—classroom teaching. Research is given short shrift largely because we understand less about its "technology," and because it offers few measurable indicators, let alone a quantifiable output. To be sure, few adequate measures of the output of teaching exist, but the available measures at least are suggestive of process and quality. This chapter begins with an examination of the alternatives open to institutions for producing a service that is sold in a rather competitive market: undergraduate education. It notes the significant differences in the approaches that research universities and liberal arts colleges actually take and then proceeds to examine trends in faculty classroom teaching loads in the sample institutions. Following this discussion are two short sections presenting some evidence from one institution on trends in advising and committee work. The chapter ends with a brief concluding section.

ALTERNATIVE METHODS OF ORGANIZING UNDERGRADUATE INSTRUCTION

The university is a diversified enterprise in which several distinct but related activities are performed. Research occurs largely behind

closed doors, in libraries, laboratories, and faculty offices, although field work is vital to the research in many disciplines as well. Public service, of course, assumes many forms. The primary focus of this and the next chapter is teaching. Professional schools aside, the teaching performed at research universities is carried out on two rather distinct levels. Undergraduates have most of their contact with faculty members in formal classes, although it is not uncommon for them to meet with faculty outside of class. Graduate students, most prominently those pursuing doctorate degrees, usually receive their classroom instruction in small classes early in their programs, moving to quite specialized work with individual faculty members—on faculty research projects and in their own dissertation research—toward the end of their graduate careers. A key element in the practices that research universities follow is the dual role played by many graduate students: not only are they students in their own right, but they also serve as instructors and teaching assistants for undergraduate classes, particularly in introductory courses.

In principle, like the generic firm studied in economics textbooks, a university can choose from a variety of techniques in deciding how to teach students. Although recent advances in computers and communications have the potential to bring about significant change in current practices, the typical "technology" employed in teaching remains on the primitive side. To teach undergraduate courses, for example, universities can make use of such time-honored techniques as lectures, discussion sections, and seminars. Historians of higher education tell us that the lecture replaced the individual recitation as the preferred teaching method in colleges during the 19th century.[3] Usually accompanied by visual aids transmitted by blackboard (first used at Bowdoin around 1823) and later often enhanced by microphones and overhead projectors, the lecture remains the mainstay of teaching at this level. The other principal organizational techniques used for classroom instruction are the seminar, which was first used in the form that we know it more than a century ago, and the discussion section, apparently first developed at Harvard at the turn of the century (Boyer 1987, p. 149). Colleges have options as to technique as well, albeit more limited ones, as they have no graduate students on whom they can call. Both colleges and universities also have options about how much faculty advising or undergraduate written work to expect. Given the considerable degree of discretion that institutions have along these dimensions (at least in the long run), and the implications of these decisions on their budgets, not to mention the potential effect on the quality of education, it is important that a study of expenditures look explicitly at how teaching is carried out.

In selecting how classes are staffed, an institution deals with several variables: the average size of classes, the number of courses, the classroom teaching load of faculty, the size of the student body, and the use of instructors who are not members of the regular faculty. Of these, perhaps the starkest trade-off is that between faculty classroom teaching load and average class size. This trade-off may be illustrated by considering a simple example of a college, in which the regular faculty does all the teaching and all classes are of the same size. For illustrative purposes, suppose the college has a faculty numbering 150, it enrolls 1,850 undergraduate students, and each student takes eight courses per year. If classes contain C students each, a total of $8(1{,}850)/C$ classes must be taught. This can be accomplished if the average faculty member teaches L courses per year, where C and L satisfy the equation:

$$150\,L = 8(1{,}850)/C. \tag{1}$$

Rewriting the equation yields

$$LC = 98.7, \tag{1'}$$

which makes it clear that the teaching load L and the class size C are inversely related, one falling only if the other increases. This inverse relationship is shown by the dark curve in Figure 7.1. Given the assumed student load of eight courses per year, the curve demonstrates, for example, that the college could achieve an average classroom teaching load of four courses per year if class size were about 25, but that if it wished to reduce class size to 15, the average load would have to be more than six courses per year. Illustrating another dimension of choice, if students were required to take nine courses per year rather than eight, then the options become more severe, requiring larger class sizes, heavier teaching loads, or both. Either line shows, for the given student course load, the feasible combinations available to the college (comparable to the "isocost" line for the firm, showing the combinations of inputs requiring a given amount of expenditure). Regardless of how it chooses its own preferred combination, the college must face the fact that it cannot have *both* smaller classes and a lower average classroom teaching load for its faculty.

When one adds the option of using other kinds of instructors, such as nonregular faculty and graduate students, the calculations become more complicated, but the essence of this trade-off remains the same. Figure 7.2 illustrates the feasible combinations of class-

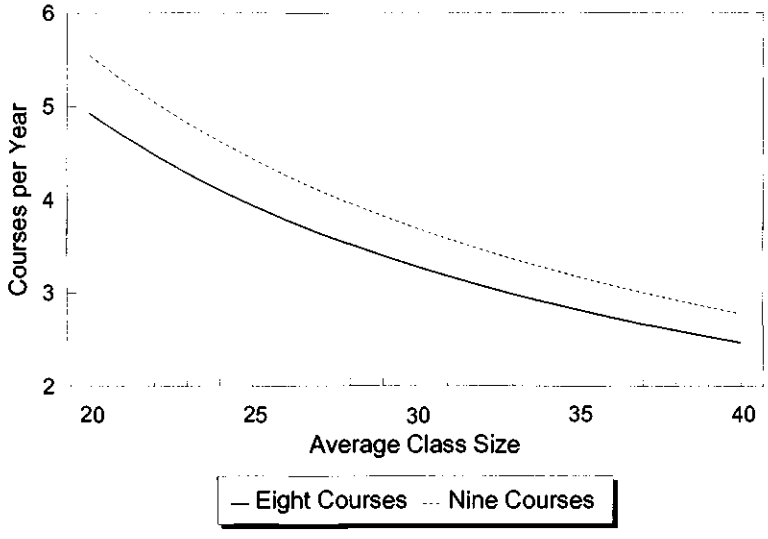

Figure 7.1 Combinations of Class Size and Teaching Load: Options for a College.

Source: Numerical example assuming 1,850 students and 150 faculty. See text.

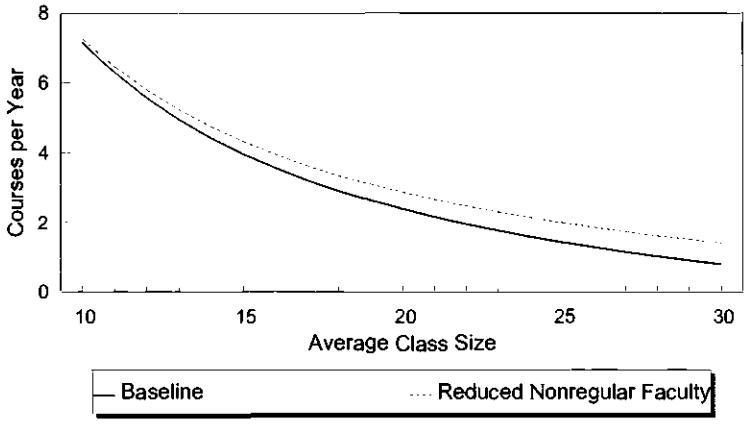

Figure 7.2 Combinations with Nonregular Faculty.

Source: Numerical example. See Appendix 7.1.

room teaching load and average class size for a hypothetical research university that uses both graduate students and nonregular faculty in addition to regular faculty in undergraduate courses.[4] Two alternative sets of choices are shown, differing only by the relative weight given to nonregular faculty in teaching undergraduate courses. The "reduced nonfaculty" scenario halves the number of courses taught by nonregular faculty in the baseline case and uses the budgetary savings to hire more regular-rank faculty, resulting in all points shown having the same cost. As is evident, this reallocation increases the average classroom teaching load of the regular faculty, because these faculty have a considerably higher average per-class cost than do nonregular faculty. Similar trade-offs exist and could be graphed involving other variables, including the number of graduate students, the amount of teaching that is expected of the graduate students, and the size of graduate classes.

Although it is possible to describe the options that are available to colleges and universities, little will be said here about factors that determine an institution's choice of technique. Questions of pedagogy are best left to experts, although some aspects of class size are noted in the next chapter. The essential points are simply that institutions do have choices about how teaching will be done, particularly at the undergraduate level, and that these choices have significant budgetary ramifications. For one of the institutions in the study, Carleton College, the published proceedings of its budget priorities committee reveal that the college remained constantly aware of its resource constraints and of the available trade-offs. In the face of the stagnation of real faculty salaries in the late 1970s and faculty pressure for improvements on that front, this committee debated the relative merits of increasing the enrollment of the college or reducing the size of the faculty. Although committee members expressed concerns about the effects of a larger student body on the "'intimate, personal freshman experience' that now characterizes Carleton," the committee more than once expressed reluctant support for the option of increasing enrollment. In fact, enrollment was allowed to increase over the period of study, from 1,700 to about 1,850. Increasingly, the committee also turned to tuition increases as a means of improving faculty salaries and maintaining the quality of its programs without increasing enrollment excessively. Concern also was expressed over what was perceived to be unduly burdensome teaching loads.[5] An institution may find that choices it has made in the past, manifested in the existence of programs, institutional traditions, and the architectural constraints of classroom buildings, greatly limit its latitude of choice at any given moment. Yet move-

ment is possible at the margin, and it is the measurement of levels and trends in these variables—variables determined largely at the institutional level—to which we now turn.

WHAT DO FACULTY DO?

As noted in chapter 2, the culture of colleges and universities, particularly those in a position to be truly selective in their hiring of faculty and admission of students, allow faculty members considerable freedom, but this freedom is limited by institutionally determined constraints. These constraints include the prevailing classroom teaching load, a condition of work that is quantifiable, as well as the more amorphous but equally important set of expectations concerning research, student advising, administrative effort, service outside the institution, and the quality of teaching effort that usually are no more than an implicit part of the labor contract between faculty members and their employing institution. A major purpose of this chapter is to examine one of the measurable aspects of these conditions of employment that manifest themselves in the faculty's allocation of time: the classroom teaching load. For any one institution, trends in measured loads indicate changes in the institution's choice about how it will use faculty. The chapter also presents some information on advising at one institution.

Before turning to measures of classroom teaching loads at the sample institutions, it is important to emphasize that classroom teaching is only one of several important tasks that faculty perform. Research is, of course, another principal activity, and is an especially prominent one at research universities. To varying degrees, faculty also spend time participating in the administration and governance of their institutions, as well as in public service and consulting activities outside the institutions.

Often overlooked in enumerations such as this, however, are the unseen aspects of teaching and the set of faculty tasks that fall between the cracks of categorization. For every hour spent in classroom teaching, additional time is required to organize course materials, prepare for class, meet with students, read and grade student assignments, and write student recommendations. For faculty who advise graduate students, particularly those who advise doctoral students working on their dissertations, teaching takes the form of individualized mentoring—reading, reacting, questioning, and suggesting. In addition to these activities that relate directly to teaching are a host of functions that often pass without comment because they

are so basic to what is assumed to go with the territory. Included in this group of activities are anonymous referee reports and reviews undertaken on behalf of academic journals, publishers, and university review committees. And, as Bowen and Schuster (1986, p. 69) emphasize, faculty are expected to "keep up" in their disciplines. About the whole set of duties undertaken by faculty, they state: "There is no end to the amount of time and effort that can usefully be devoted to them."

The time available is limited, however, and it is instructive to learn how faculty members actually allocate their time. As an aggregate, faculty report average work weeks exceeding 50 hours, with slightly longer work weeks at research universities than at other types of institutions. How they use that time differs markedly by type of institution. As shown in Table 7.1, research accounted for 30 percent of the average faculty member's time at private research institutions, compared with just 8 percent for faculty at liberal arts colleges. In addition, faculty at private research universities spent more time on consulting and other work outside the institution (11 percent) than did other faculty, particularly those at liberal arts colleges (4 percent). These differences reflect differences in teaching time between private research universities and liberal arts colleges (40 percent versus 65 percent). In most respects, the time allocation of faculty is similar in public and private research universities.

The differences in time allocation shown in the table are reflected in the incomes of faculty. In 1987, faculty at private research universities reported that the income they received from their institutions

TABLE 7.1
Percentage of Time Spent on Various Activities by Full-Time Faculty: Selected Types of Institutions, Fall 1987

	All Institutions	*Research Universities*		*Liberal Arts Colleges*
		Public	*Private*	
Teaching	56	43	40	65
Research	16	29	30	8
Administration	13	14	14	14
Community Service	4	3	2	5
Other Work	7	7	11	4
Professional Development	5	4	4	4
Total	100	100	100	100

Source: Data are from U.S. Department of Education (1991), p. 55, Table 2.7.
Note: Components may not sum to total as a result of rounding.

over and above their base salaries, typically covering summer research, plus their consulting income equalled an average of 32 percent of their base salary. By comparison, these sources of income represented only a 9 percent enhancement of the base salaries of faculty in liberal arts colleges (U.S. Department of Education 1991, p. 95, Table 3.2).

One of the criticisms that has been leveled at higher education in recent years is that faculty increasingly have neglected undergraduate teaching. William Bennett's (1986) address at Harvard is one prominent example. There, he presented a tongue-in-cheek formulation of "Bennett's axiom," which held that the more money universities have, the fewer distinguished professors they have doing classroom teaching. Surveys appear to support the hypothesis that, to some extent, faculty, especially those at research universities, have turned their attention away from undergraduates. Table 7.2 reports on surveys conducted in 1975, 1984, and 1989, covering faculty in all institutions and in research institutions alone. The table shows both the median number of hours per week and the percentage of faculty who reported spending 10 or more hours per week in: (1) classroom instruction with undergraduates, (2) classroom instruction with graduate and professional students, and (3) office hours. The

TABLE 7.2
Faculty Time Typically Devoted to Classroom Teaching and Office Hours, 1975, 1984, and 1989

	Median Number of Hours per Week			*Percentage Spending more than 10 Hours per Week*		
Activity and Type of Institution	*1975*	*1984*	*1989*	*1975*	*1984*	*1989*
Undergraduate Classroom Instruction						
All institutions	8.2	7.8	8.9	41.0	38.9	43.8
Research universities	3.5	2.7	3.5	13.1	8.7	8.0
Graduate Classroom Instruction						
All institutions	0.3	0.0	0.7	4.8	2.7	2.9
Research universities	2.2	1.6	2.2	5.7	3.0	1.8
Scheduled Office Hours						
All institutions	5.4	4.8	3.5	22.3	15.1	7.0
Research universities	4.2	3.0	2.9	21.9	10.8	4.3

Source: Calculations by Ehrenberg (1991), pp. 202–4.

Note: Medians are calculated by interpolation from percentage distributions. For further explanation of methodology used, see footnote in Ehrenberg (1991).

only evident trend with respect to undergraduate instruction was the definite decrease in the percentage of faculty at research universities spending more than 10 hours per week in undergraduate classroom instruction. There was also an overall decline in the percentage spending as much as 10 hours per week in graduate instruction. The activity experiencing the most dramatic change was scheduled office hours. For all institutions and for research universities alike, both the median number of hours and the percentage scheduling more than 10 hours declined over this period. Whereas more than one-fifth of faculty in research institutions in 1975 scheduled more than 10 hours of office hours per week, the comparable fraction had dropped to less than 1 in 20 by 1989.

TRENDS IN FACULTY CLASSROOM TEACHING LOADS AT FOUR INSTITUTIONS

To assess trends in classroom teaching effort, administrative data from the four institutions in the sample were used to calculate average classroom teaching loads.[6] Calculations were made for regular-rank faculty in each of the three corresponding departments at each institution (one each in humanities, natural sciences, and social sciences and one engineering department at Duke) for each of the four years of study (1976/77, 1981/82, 1986/87, and 1991/92). The basic unit used to measure classroom teaching load is the course. In semester systems, a course consists of the equivalent of three 50-minute "hours" of meetings per week, which might, for example, be combined into two 75-minute meetings; in quarter systems, a course consists of the equivalent of five 50-minute sessions per week over a proportionately shorter term. Courses under the two systems generally are regarded as equivalent, and are treated as such here.

In the calculations presented in this chapter, a faculty member is credited only with time spent in the classroom conducting a regular class. Reductions are made for shared teaching, labs, or discussion sections conducted by teaching assistants, and for courses that normally consist of presentations by others. More important, the calculations omit time spent in course preparation, conferring with students after class or in office hours, grading examinations and other written work, and writing student recommendations. Classroom teaching was recorded for all regular (tenured or tenure-track) faculty in each department. In addition, the number of faculty not on leave (or the FTE effort, if available) was summed. Any administrative duties undertaken by faculty, from department chair to coordinator for a science course's labs, are ignored.

Although this approach may appear relatively straightforward, the customs and peculiarities of college and university teaching make it necessary to make use of several simplifying and, ultimately, arbitrary assumptions. As with the exclusion of all hours of teaching effort that do not occur in the classroom—an exclusion necessitated by the absence of data—these assumptions can be justified only by arguing that rough quantification of what can be observed will be a useful addition to our knowledge of resource allocation in these institutions. Several of the assumptions are noted briefly here. Appendix 7.2 provides a more detailed account of the calculations used.

Hours in all courses were given equal weight, and faculty who shared courses received the corresponding proportionate share of both the course hours and enrollment for those courses, with four major exceptions. The first exception was the exclusion from the calculation of hours of formally constituted credit courses for supervision of doctoral dissertations. The institutions differed in how they recorded this type of instruction. Moreover, this kind of instruction blends with the other personalized attention that is excluded from the calculations. The second exception was for graduate colloquium or workshop courses consisting mainly of presentations by faculty or graduate students, as this work normally does not require the level of preparation demanded by most courses. Where only one faculty member's name was listed for such courses, that person was credited with one-third of a course, to reflect this reduced responsibility. However, in the one university whose records contained all the participating faculty, the general rule of dividing the hours equally among faculty was applied. The third exception was for labs, which generally were supervised by regular faculty in only one of the institutions studied. Although these labs typically were scheduled for four hours, faculty were credited with only one hour of classroom teaching for each lab taught. The fourth exception deals with "independent study" courses, in which students typically work on reading or research projects and meet periodically with their sponsoring professors. Occasionally, these course designations are used when a professor teaches a new course to a small class. In order to reflect the more limited time commitment that is typical of these classes, a weight of one-sixth of a course (reflecting, for example, one hour of meeting every two weeks in the semester system) was given to each student enrolled in an independent course number per term, up to a maximum of six, after which the course was weighted as a regular course.

A second measure of classroom teaching used in this chapter replaces the number of contact hours with the number of students enrolled in a faculty member's classes. As with the measure based on

hours, enrollments were divided in the case of team-taught courses, but no other distinction was made on the basis of the type of course taught.

Like most of the institution-specific data presented in this study, these measures of classroom teaching most appropriately are used to chart trends over time only within an institution (actually, only within an individual department). Although every attempt was made to ensure the comparability of the measure of classroom teaching load across institutions and among departments within each institution, differences in custom, teaching technique, and data make cross-section comparisons problematic. An average load of four courses in a department in which faculty are expected to undertake extensive individualized work with each student will mean something different from the same calculated load in a department in which this expectation does not exist. As long as customs and teaching techniques remain fairly stable over time, however, changes over time in these measures within a department can be assumed to signify a real shift in resource allocation.

Duke

Figure 7.3 shows the trends in classroom teaching loads in the four sample departments at Duke from 1976/77 to 1991/92. The bars in each graph represent the average amount of classroom teaching, measured in number of courses, for regular faculty, divided between undergraduate and graduate classes. It is quite evident that the general trend at Duke was downward: in every department, the level in the most recent year was lower than the level during the initial period. The largest absolute decline occurred in the humanities department, in which the average classroom teaching load fell from 5.6 to 4.2 courses per year, a decrease in classroom teaching of one-fourth. In the natural sciences department, the average load also fell by one-fourth, from 3.4 to 2.5 courses per year, which was the result of an increase in graduate teaching and a larger decrease in undergraduate teaching. Despite an overall decline in classroom teaching of 16 percent, the social sciences department likewise experienced an increase in graduate teaching. Graduate instruction did not play a large part in the engineering department, where average loads fell by more than 20 percent. Although they are based on only four departments, these figures strongly suggest that classroom teaching loads at Duke, measured in terms of classroom contact hours, declined markedly during this 15-year period.

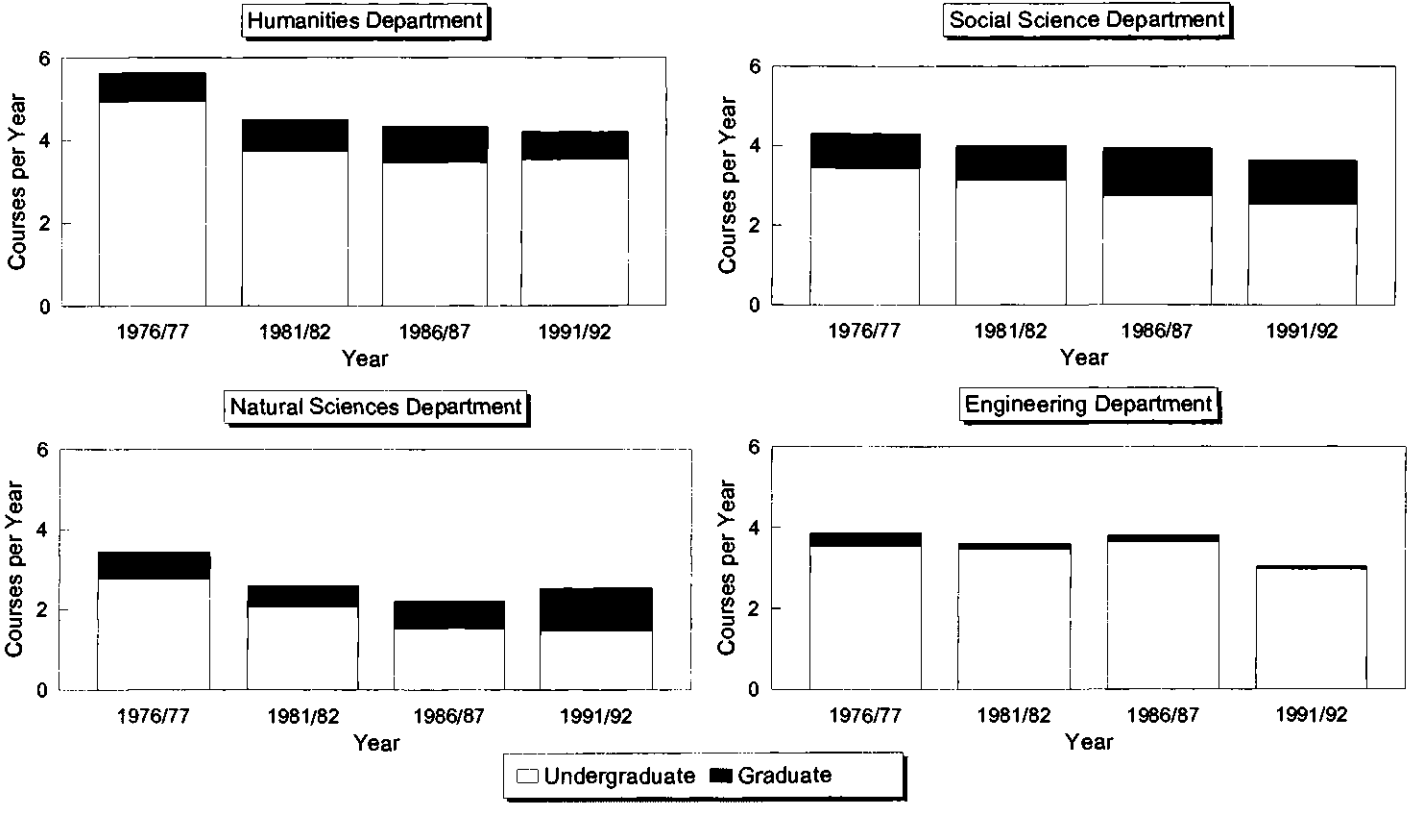

Figure 7.3 Classroom Teaching Loads, Four Departments: Duke.

Source: Calculations using unpublished data from Duke.

TABLE 7.3
Average Classroom Teaching Loads per FTE:
Duke, Four Representative Departments

	Courses per Year		*Enrollment*	
Department and Year	*Total*	*Graduate*	*Total*	*Graduate*
Humanities				
1976/77	5.63	0.70	111.7	3.6
1981/82	4.50	0.77	96.9	5.3
1986/87	4.33	0.87	86.0	6.6
1991/92	4.20	0.67	84.3	6.7
Social Sciences				
1976/77	4.30	0.87	145.6	7.4
1981/82	4.00	0.87	109.6	6.1
1986/87	3.93	1.20	137.0	18.3
1991/92	3.63	1.10	98.3	11.6
Natural Sciences				
1976/77	3.43	0.67	115.3	7.1
1981/82	2.60	0.53	109.1	5.8
1986/87	2.20	0.67	90.5	12.6
1991/92	2.53	1.07	86.2	10.2
Engineering				
1976/77	3.87	0.33	67.4	2.1
1981/82	3.60	0.13	82.1	0.8
1986/87	3.80	0.17	82.6	0.9
1991/92	3.03	0.07	61.3	0.3

Source: Calculations using unpublished data from Duke.

Teaching loads measured in terms of students enrolled also declined over the period, but the patterns are not as stark. As shown in Table 7.3, the average enrollment per faculty member declined steadily in two of the four departments (humanities and natural sciences). The percentage declines in these two departments matched the declines in faculty contact hours, 25 percent. For example, the average number of students taught by faculty in the humanities department declined from 112 to 84. Enrollments per faculty member in the other two departments fell over the period, but not steadily. The heaviest loads were in the social sciences department, in which the average faculty's load fell from 146 to 98 students per year.

Harvard

The comparable calculations for Harvard are displayed in Figure 7.4 and Table 7.4. One striking difference between Duke and Harvard is

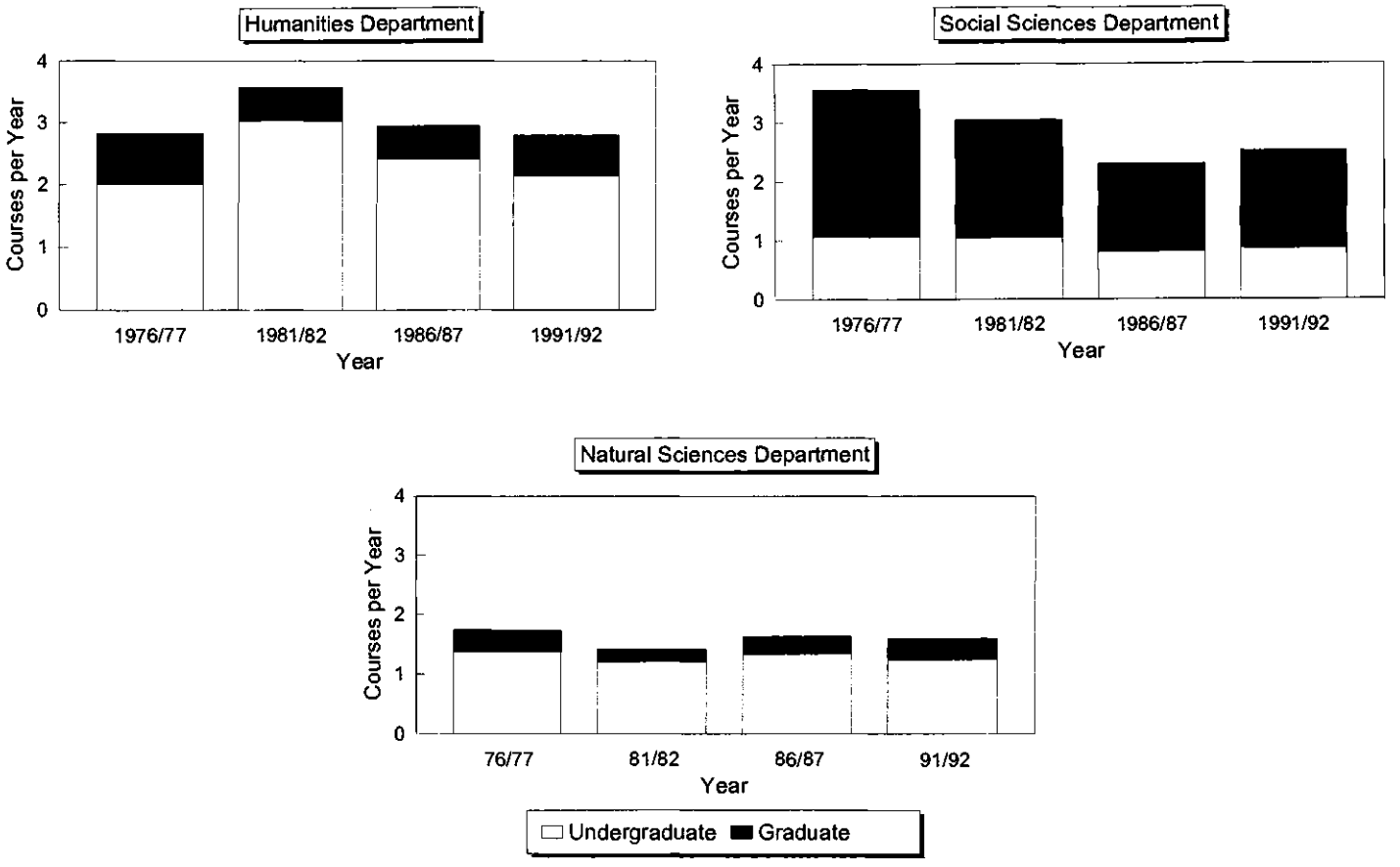

Figure 7.4 Classroom Teaching Loads, Three Departments: Harvard.

Source: Calculations using unpublished data from Harvard.

TABLE 7.4
Average Classroom Teaching Loads per FTE:
Harvard, Three Representative Departments

	Courses per Year		*Enrollment*	
Department and Year	*Total*	*Graduate*	*Total*	*Graduate*
Humanities				
1976/77	2.82	0.81	154.1	4.6
1981/82	3.57	0.54	145.6	4.3
1986/87	2.94	0.52	187.3	4.2
1991/92	2.80	0.66	152.2	5.6
Social Sciences				
1976/77	3.56	2.50	135.4	38.9
1981/82	3.04	2.00	143.5	18.0
1986/87	2.29	1.49	113.9	15.6
1991/92	2.52	1.66	129.5	24.5
Natural Sciences				
1976/77	1.74	0.36	133.0	2.9
1981/82	1.43	0.22	111.2	2.1
1986/87	1.63	0.30	105.0	4.0
1991/92	1.61	0.36	108.3	2.1

Source: Calculations using unpublished data from Harvard.

the overall lower teaching loads, measured in courses per faculty member, at Harvard. Even allowing for some differences between the universities that might lead to some lack of comparability, the calculated differences are simply too large to conclude anything other than that real differences in teaching loads did exist during this period. One other obvious difference is the larger share of total teaching accounted for by graduate courses in Harvard's social science department. As at Duke, the trend in average teaching load is downward, but the changes at Harvard generally were smaller than those at Duke. Measured by the percentage change in average classroom hours between the first and final years, teaching loads at Harvard decreased about 1 percent in the humanities department, 7 percent in the natural sciences department, and 29 percent in the social sciences department. In addition, overall classroom teaching loads as measured by enrollments in the departments declined somewhat. These enrollment average loads were larger than those for the corresponding departments at Duke, reflecting differences in the size of lecture courses.

Chicago

Figure 7.5 presents the corresponding data on average classroom teaching loads at Chicago for the sample years. These levels are expressed in numbers of courses, which at Chicago were quarter courses, representing only about three-fourths of the total number of hours of contact time as the semester courses at Duke and Harvard. The large relative size of the shaded portions of the bars reflects Chicago's strong emphasis on graduate instruction. As at Harvard, a majority of classroom teaching by faculty in social sciences was in graduate-level courses; in the other two departments, the graduate shares were roughly twice those at Harvard. The trends over time in the aggregate loads, as with Duke and Harvard, are downward, if only modestly so in two of the three departments. Calculated as a percentage change from the first to last years observed, the average loads for graduate and undergraduate courses declined about 6 percent in the humanities and social sciences departments and 29 percent in the natural sciences department. No consistent trend is observed in classroom teaching loads measured in terms of enrollments per FTE faculty, which is shown in Table 7.5.

TABLE 7.5
Average Classroom Teaching Loads per FTE: Chicago, Three Representative Departments

	Courses per Year		*Enrollment*	
Department and Year	*Total*	*Graduate*	*Total*	*Graduate*
Humanities				
1976/77	4.58	1.99	78.1	12.2
1981/82	4.57	1.19	86.2	9.1
1986/87	4.36	1.42	82.0	12.0
1991/92	4.17	1.26	86.2	13.8
Social Sciences				
1976/77	3.32	2.71	90.3	70.4
1981/82	3.18	2.35	83.3	56.4
1986/87	3.24	2.52	79.7	58.0
1991/92	3.13	2.38	98.6	78.7
Natural Sciences				
1976/77	3.08	1.46	131.6	19.1
1981/82	2.67	1.78	73.7	17.6
1986/87	2.38	0.97	114.8	17.4
1991/92	2.20	1.01	100.0	17.0

Source: Calculations using unpublished data from Chicago.

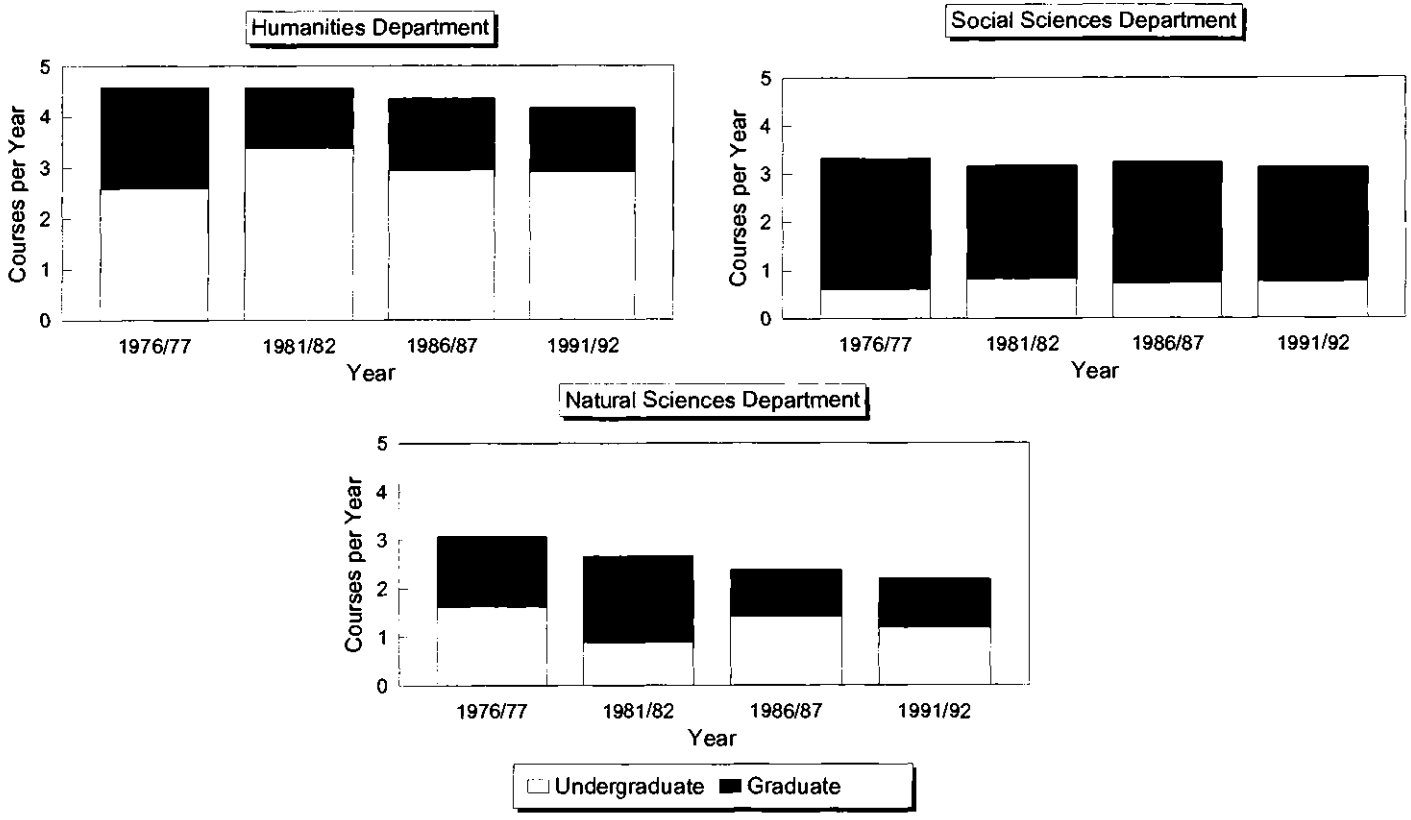

Figure 7.5 Classroom Teaching Loads, Three Departments: Chicago.

Source: Calculations using unpublished data from Chicago.

Carleton

The information on classroom teaching load at the one liberal arts college in the sample, shown in Figure 7.6, is striking evidence of one important difference in the nature of the faculty's work at colleges and at research universities. As in the previous figures, classroom teaching loads are measured in average number of courses taught per year. Although Carleton, like Chicago, was on a quarter system, its courses were roughly comparable to semester courses in total contact hours. Thus measured, the classroom teaching loads in the sample departments at Carleton were noticeably higher than their counterparts in any of the research universities studied. Even allowing for the unavoidable differences in measurement and culture among the institutions, these differences are too great to avoid concluding that faculty at Carleton spent considerably more time in classroom teaching than comparable faculty in any of these research institutions. Nevertheless, the measured loads at Carleton exhibit the same downward trend over this period that was evident in the universities. The average load in the humanities department dropped from 7.3 courses per year in 1976/77 to a low of 5.8 in 1986/87 and then rose to 6.8 in the last year, for a 7 percent overall decline over the 15-year period. In the other two departments, the declines in classroom teaching loads were both steady and steep. In the natural sciences department, the measured load fell from 6.8 to 4.8 courses per year, a decline of 29 percent. In the social sciences department, the drop was even larger, from 9.7 to 5.7 courses per year, or 41 percent.

Table 7.6 shows classroom teaching load as measured by enrollments per FTE. As with the universities, no consistent pattern is observed. These loads generally fell in the natural sciences department but rose in the humanities department. Taken together, loads in the three departments, as measured by enrollment, converged over the period.

ADVISING

In addition to classroom teaching, faculty at research universities typically perform several prominent functions, among which are research, professional activities (including peer reviews of scholarly work and participation in the activities of professional organizations), advising students, and service on departmental and univer-

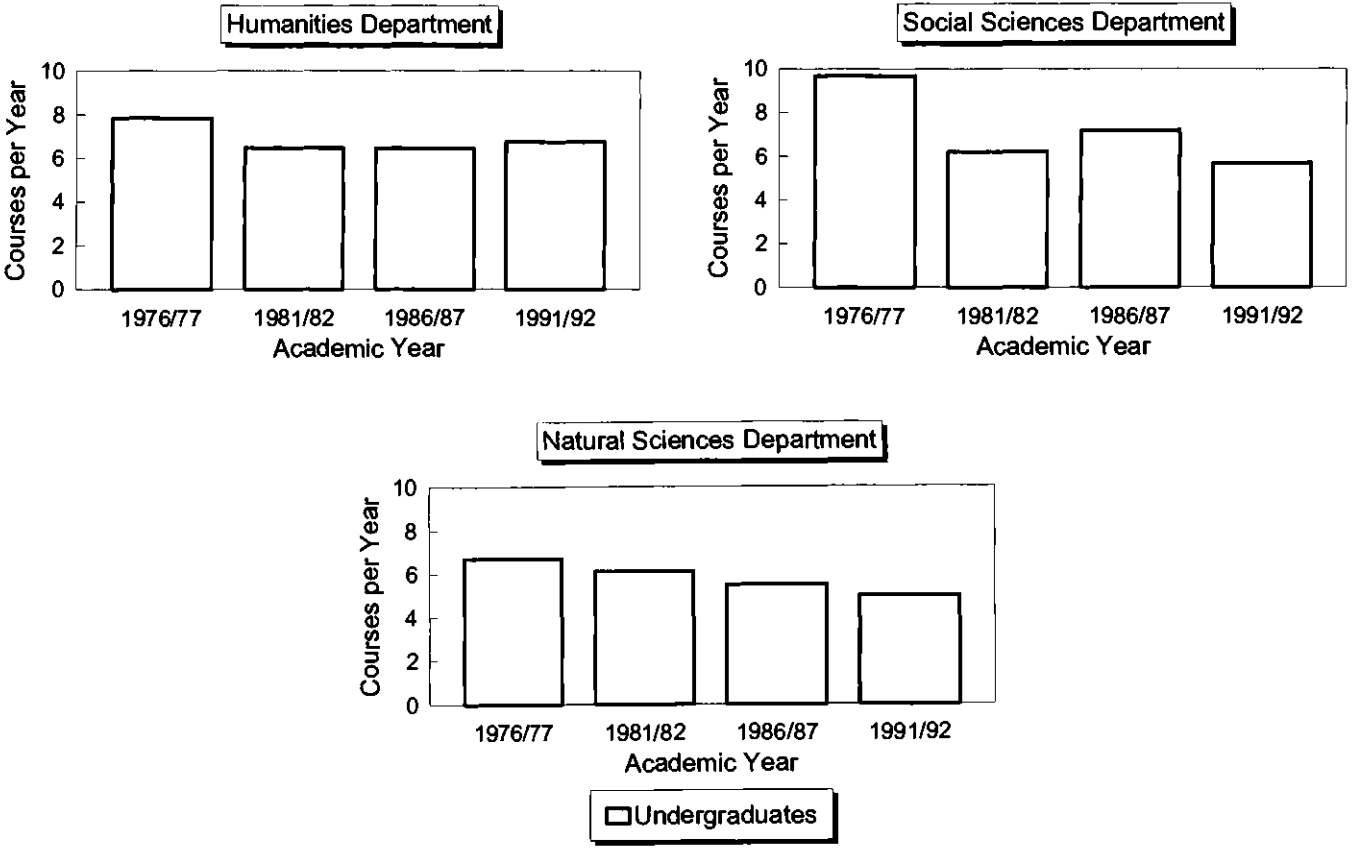

Figure 7.6 Classroom Teaching Loads, Three Departments: Carleton.

Source: Calculations using unpublished data from Carleton.

TABLE 7.6
Average Classroom Teaching Loads per FTE:
Carleton, Three Representative Departments

Department and Year	*Courses*	*Enrollment*
Humanities		
1976/77	7.3	130.5
1981/82	6.5	111.4
1986/87	5.8	136.2
1991/92	6.8	145.1
Social Sciences		
1976/77	9.7	179.2
1981/82	6.2	159.5
1986/87	7.2	153.8
1991/92	5.7	128.6
Natural Sciences		
1976/77	6.8	243.3
1981/82	6.2	253.5
1986/87	5.5	196.9
1991/92	4.8	163.3

Source: Calculations using unpublished data from Carleton.

sity-wide committees. In order to understand the changes in resource allocation within research universities, it is helpful to know more about how faculty members spend their time. Surveys, such as those summarized above in Table 7.1, give a broad-brush impression of changes over time, but it is possible to do a better job of describing the work of faculty by using an unusual source of data—surveys that routinely were sent to Duke faculty requesting information on advising, independent study classes, and committee work. The next two sections use this information, as well as some administrative records from Carleton, to examine faculty advising and committee work. The tabulations use information from these data sources for the same representative departments previously referred to in this chapter.[7]

Formal student advising in research universities may take a number of different forms. At the level of the academic department, undergraduate majors, master's degree students, and doctoral students may have advisors to assist with course planning or for large research projects, ranging from undergraduate theses to doctoral dissertations. In addition, universities typically provide advising for first-year undergraduates who have not yet declared a major. Although the arrangements for advising of majors and graduate students often differ markedly from one department to another even

in the same university, two forms of advising that tend to be measured consistently across departments are first-year (or pre-major) advising and the advising of doctoral dissertations. The former is obviously a university-wide service that goes beyond a department's narrow teaching requirements; more so even than with undergraduate classroom teaching, little in this activity can be seen as complementing research. Research is the ultimate manifestation of the personalized nature of doctoral training in a particular discipline and may be quite complementary with a faculty member's own research, even to the extent that dissertations may be based on aspects of a professor's research.

Using the Duke faculty surveys described in this section, information was collected on these two forms of advising. Pre-major advising at Duke was carried out at a central location on campus, and all advisors were required to see about the same number of students. At first, advisors were recruited on a volunteer basis. Later, beginning in the mid-1980s, they were compensated with small research grants. In contrast, the decision to chair a graduate student's dissertation review committee typically was made on a case-by-case basis, and departments sometimes rewarded this service. Table 7.7 presents data on advising for the four sample academic departments at Duke. The top section gives the percentage of faculty members, by rank, who

TABLE 7.7
Student Advising at Two Levels, by Faculty, by Rank: Four Duke Departments, Selected Years

	Academic Year			
	1976/77	*1981/82*	*1986/87*	*1991/92*
Percentage of Faculty Who Were Freshman Advisors				
Professor	15.2	14.5	12.3	9.5
Associate professor	20.0	0.0	5.9	7.7
Assistant professor	7.7	7.7	6.3	5.0
All	15.2	11.0	10.0	8.3
Average Number of Dissertations Supervised				
Professor	1.9	1.8	2.2	2.0
Associate professor	2.6	0.6	2.4	1.9
Assistant professor	1.0	0.7	0.4	1.1
All	1.9	1.4	1.9	1.8
Concentration Index	0.55	0.65	0.62	0.61

Source: Calculations using unpublished faculty census data from Duke.

were pre-major advisors in each of the four sample years. Although this percentage fluctuated somewhat over time for associate and assistant professors, overall, a clear secular decline occurred: the proportion of regular faculty in the four sample departments serving as pre-major advisors declined from about 15 percent in 1976/77 to 8 percent in 1991/92 (emeritus and other nonregular faculty are excluded from all of these calculations). Unfortunately, this decline does not quite square with information in other administrative records. According to this information, the number of regular faculty who did pre-major advising increased in conjunction with a sizable increase in the program over this period. However, the administrative data also show that the share of pre-major advising by regular faculty fell by about one-half, the slack being taken up by administrators and nonregular faculty.[8]

Trends in the supervision of doctoral dissertations in the four departments are summarized in the remainder of Table 7.7. Not surprisingly, full professors tended to have the highest average number of dissertations to supervise, and assistant professors the least. Over the 15-year period covered by the table, there was no discernible trend in the amount of advising done at any level. The absence of an upward trend is somewhat puzzling, since the total graduate enrollment in these four departments grew by 87 percent over the period,[9] and it is rare for dissertations to be supervised by anyone other than a regular faculty member of a department.[10]

As in the case of pre-major advising and other voluntary activities, differences in the amount of advising can be large, even among faculty of the same rank. In order to measure the degree to which doctoral advising is spread out among the faculty, a gini coefficient was calculated for all faculty in each year. This coefficient is an index of concentration, with extreme values that range from 0, which would be the case if the distribution of advisees were perfectly even, to 1, which would signify the extreme case in which only one professor had every advisee. The calculated indices shown in the table indicate that little change in the distribution of advisees in these four departments occurred over this period.

COMMITTEE WORK BY FACULTY

An important component of a university's administration and governance is undertaken by faculty members in their roles as administrators and committee members. Little is known about trends in committee membership, and one reason for this ignorance may be

the difficulty in measuring such membership consistently over time. The approach taken in this section is analogous to that used to track advising: consistent data on committee memberships for representative departments were collected for each of the sample academic years for two of the sample institutions. For Duke, the information on committee assignments was taken from the same faculty census forms discussed in the previous section. Each fall, faculty were asked to list the active university and departmental committees of which they were members. The faculty members' committee assignments usually were recorded as reported (the few exceptions are noted in the accompanying appendix). Carleton kept data on committee assignments as part of its administrative data.

Table 7.8 summarizes the committee memberships for the regular faculty members in the seven sample departments in each of the four sample years at Duke and Carleton. These departments had an average of about 25 faculty at Duke and about 7 at Carleton. For Duke, the assignments were divided into departmental committees, defined as those relating only to a faculty member's department, and university committees, which include college committees as well as university-wide committees. For Duke, the time trend in committee membership shows a peak in 1981/82 and a decline thereafter, whereas the average number of committee assignments at Carleton rose throughout the period.

Using data on individual committee assignments for Duke, it is possible to describe more fully the pattern of committee member-

TABLE 7.8
Faculty Membership in Committees, Four Departments: Duke and Carleton, Selected Years

Average Number of Committees per Faculty Member	*Academic Year*			
	1976/77	*1981/82*	*1986/87*	*1991/92*
Duke				
University committees	1.7	1.9	1.5	1.3
Departmental committees	1.1	1.3	1.0	1.0
Total committees	2.7	3.2	2.5	2.3
Carleton				
Total committees	1.6	1.8	1.9	2.3
Concentration Index				
Duke	0.409	0.464	0.466	0.564
Carleton	0.394	0.466	0.428	0.417

Source: Calculations using unpublished faculty census data from Duke and unpublished administrative records from Carleton.

ships. Regressions were estimated explaining committee membership among the faculty for these four departments. The estimated coefficients, which indicate the differences from the omitted groups, reveal the existence of sizable departmental differences as well as a heavier commitment of full professors in university committees. Although there generally was no overall time trend, the decline in university committee representation of roughly one-half a committee assignment between 1981 and 1991 in the four departments is significant at the 95 percent level.[11]

One interesting aspect of these data on committee assignments is the degree to which responsibilities were distributed evenly across the faculty. In order to assess this distribution, concentration indices of the sort discussed above were calculated, where an index value of 0 would refer to a completely even distribution of assignments and 1 would indicate the polar opposite, the concentration of all assignments in one person. Indices were calculated for the sample departments at both institutions. Although virtually no trend is observed for Carleton, the figures for Duke suggest a steady increase in the inequality in number of committee assignments over time. Not only were salaries becoming more unequal at Duke, so, too, was the burden of university citizenship, as measured by committee memberships.

CONCLUSION

Like the theoretical firm featured in innumerable graphs in microeconomics textbooks, institutions of higher education have before them a menu of alternative techniques for the teaching of undergraduate students. They may offer large lectures or smaller classes, in which discussion is more feasible. They may enroll and compensate graduate students to perform some of the teaching, or they may employ as instructors individuals who are not members of the regular-rank faculty. The choice of techniques has implications for the cost of teaching undergraduates, the time available for faculty research, the number of courses that can be offered, and the kinds of classroom experiences that may be offered to undergraduate students. These choices are the result of a distinctive set of traditions and institutions for decision making. Moreover, the decisions are not always explicit. As Rosovsky (1992, pp. 186–7) notes:

> First, the dean has only a vaguest notion concerning what individual professors teach. Second, the changes that have occurred were never

> authorized at the decanal level. . . . No chairman or group of science professors ever came to the dean to request a standard load of one half-course per year. No one ever requested a ruling concerning, for example, credit for shared courses. Change occurred through the use of *fait accompli*. . . .

Once made, however, these decisions are difficult to change dramatically in a short period, although incremental changes are possible at almost any time.

If the four institutions examined here are any indication, the period between 1977 and 1992 was one of gradual, but quite perceptible, change. Virtually without exception, average classroom teaching loads, measured in courses taught per year, decreased in the sample departments. Although these calculated loads by no means cover all aspects of teaching, they are suggestive of a significant movement away from teaching and toward research. It is noteworthy that this trend was observed in the one liberal arts college studied as well as in the three research universities, all of which started from different levels. At the same time, trends in another measure of teaching load, based on enrollments rather than on time, were less clear. Moreover, in one institution, the proportion of faculty who were advisors for first-year students declined, although there was no measurable trend in advising of doctoral students. Committee work became more common at one institution and became more concentrated among a minority of faculty at another.

What is the significance of the transformation in the use of faculty implied by these findings? If institutions did not increase the average size of classes to compensate for the reduced classroom teaching loads—and the next chapter supports that assumption—then the reduced loads must have increased total costs. In order to teach a given number of classes, institutions must either have increased the size of the regular faculty or hired additional graduate students or non-regular faculty to teach undergraduates. The evidence presented in chapters 4 and 5 suggests that they took both steps. Considering first the "output" of higher education, this shift surely meant more research, at the expense of teaching by regular faculty, and the net effect on total output may well have been positive. There is less ambiguity about its effect on costs, however: this shift pushed up the cost of operating the institutions. For a more complete assessment of the effects of these reallocations on undergraduate instruction, it is necessary to turn to evidence on the measurable characteristics of courses.

Appendix 7.1

Options for Providing Classroom Instruction

To SEE THE NATURE of the choices regarding teaching that are open to an institution, it is helpful to consider a simple model that links undergraduate teaching inputs and a budget constraint. Specifically, I consider a highly simplified model that assumes all undergraduate classes are of one equal size, C_u, and all graduate classes are of another size, C_g. The number of required undergraduate classes is equal to the number of undergraduates U multiplied by the number of courses each student takes per year R divided by average class size C_u; the number of required graduate classes is defined similarly. The supply of classes is given on the right-hand side of the equation and consists of the product of the faculty size F and faculty classroom teaching load L_f plus a similar term for graduate students plus the number of classes taught by nonregular faculty X.

$$U\,R/C_u + G\,R/C_g = F\,L_f + G\,L_g + X. \tag{7.1}$$

If income is derived from undergraduate tuitions of T per student and all graduate students are paid a stipend of S_g, then the institution's budget constraint is given by

$$T\,U = F\,S_f + G\,S_g + X\,P_n, \tag{7.2}$$

where S_f is the average salary for faculty and P_n is the average price per course for nonregular faculty.

For the purpose of calculating the possibility functions shown in Figure 7.2, this model was calibrated using a combination of estimates and actual figures for arts and sciences at Duke in 1991/92. The values for the baseline simulation were: $U = 6{,}055$, $G = 2{,}122$, $R = 8$, $C_g = 13$, $F = 506$, $L_g = .3$, $X = 742$, and $P_n = \$7{,}500$.

The alternative scenario assumed $S_f = \$62{,}818$; reducing X to 371 allowed \$2.28 million to be used to hire 44 (\$2.28 million/\$62,818) additional faculty.

Appendix 7.2

Calculation of Classroom Teaching Loads and Course Characteristics

THE MEASURES of classroom teaching load, average class size, and other classroom characteristics presented in the text use data sets for each of the institutions studied. Although there are minor differences among institutions in how various data components are defined, most variables used here are more or less standard and would be readily available to administrators who wished to calculate these measures for their own institutions.

DATA

For each of the four institutions, information was collected on every course offered by each of the three sample departments (one each in humanities, natural sciences, and social sciences, plus an engineering department at Duke), in each of the four sample academic years (1976/77, 1981/82, 1986/87, and 1991/92). The basic information required for these calculations generally is available from an institution's registrar. It includes the course number and name; the name of the instructor; the number of credits; whether the course included recitation sections or labs; and the enrollment, specified as undergraduates enrolled through that department, graduate students enrolled through the department, and other students enrolled in the course who were not arts and science students or who had enrolled in a cross-listed course.[12] Other data were collected to supplement this information for the purpose of determining the rank of instructors, clarifying the meeting schedule of classes, and obtaining information on sections. These supplementary data sources included course catalogs; lists of faculty, with ranks, provided by the institutions; faculty census forms at Duke, giving information on teaching, advising, and other professional activities; and information on the number of sections and meeting schedules provided by the institutions.

It is worth noting, as a word of both warning and encouragement to those unfamiliar with the kind of data that university registrars

typically maintain, that information of this sort is seldom tidy or consolidated, and local knowledge is indispensable. For the present study, verification of information often took the form of specific questions that cannot be answered by examining official computer records of classes, such as: "How many sections did this course have in the fall of 1981?" and "Did this course normally meet for two or three lectures per week in addition to the section?" Although no two institutions follow the same record-keeping procedures or conventions, it is reasonable to expect that any comparable institution can construct a fairly similar data series, which is internally consistent over a period such as that employed in the present study.

In order to illustrate the kinds of data used and the calculations, Table 7A.1 presents information for a hypothetical music department. Each instructor for each course was listed as a separate observation. A team-taught course, such as Music Appreciation II, has more than one observation. If a class (or a part of class) met in a discussion section or lab, each section or lab was listed in addition to the lecture. The list of courses offered by a department includes those taught by faculty who are not in the department (for example, Music History is taught by a history professor). In addition, information was collected on courses outside the department that were conducted by faculty who were members of the sample department (for example, Economics of the Performing Arts is a course offered by the economics department, but taught by a music professor).

CLASSROOM TEACHING LOAD

The basic measure used in this study to measure classroom teaching load is based on the average weekly contact hours of courses taught by a full-time member of the regular faculty. A second, alternative measure is the total enrollment in courses taught by a faculty member over the course of a year. The discussion here refers to the basic measure, but most of the discussion applies to the alternative measure as well. The basic measure attempts to approximate the amount of time that faculty spend in formal classroom instruction. For example, if a faculty member meets with a class for two 50-minute "hours" per week, with the class meeting in sections led by graduate student teaching assistants a third time, this counts as two hours. Subject to several modifications noted below, this measure of teaching load therefore counts only teaching time spent in the classroom. As such, it fails to account for several important activities that are central to teaching, among them, preparing for classes, meeting with

TABLE 7A.1
Hypothetical Data for Calculating Teaching Loads and Classroom Characteristics

Course #	*Course Name*	*Instructor*	*DEPTINS*	*Rank*	*DEPTOFF*	*TEAM*	*PERHRS*	*SHRS*
MU 101	Music Appreciation I	Nelson	MUS	Assistant Professor	MUS	1	1	3
MU 102	Music Appreciation II	Nelson	MUS	Assistant Professor	MUS	0.5	0.5	3
MU 102	Music Appreciation II	Reynolds	MUS	Professor	MUS	0.5	0.5	3
MU 121	Music Theory I	Stevens	MUS	Visiting Professor	MUS	1	1	3
MU 122	Music Theory II	Summers	MUS	Lecturer	MUS	1	1	3
MU 129	Ear Training	Nelson	MUS	Assistant Professor	MUS	1	1	1
MU 141.01	Independent Study: Cello	Reynolds	MUS	Professor	MUS	1	0.167	3
MU 141.02	Independent Study: Violin	Davis	MUS	Associate Professor	MUS	1	0.333	3
MU 146	Music History	Miller	HST	Professor	MUS	1	1	3
MU 155	Great Russian Composers	Reyonds	MUS	Professor	MUS	0.5	0.5	3
MU 155	Great Russian Composers	Miller	HST	Professor	MUS	0.5	0.5	3
MU 161	Conducting	Kane	MUS	Professor	MUS	1	0.75	4
MU 161.01	Conducting Laboratory	Lewis	MUS	Graduate Student	MUS	1	0.25	4
MU 169	Advanced Music Theory	Smith	MUS	Associate Professor	MUS	1	0.667	3
MU 169.01	Advanced Music Theory Discussion	Lewis	MUS	Graduate Student	MUS	1	0.333	3
MU 169.02	Advanced Music Theory Discussion	Lewis	MUS	Graduate Student	MUS	1	0.333	3
MU 181	Advanced Composition	Smith	MUS	Associate Professor	MUS	1	1	3
MU 202	Workshop: Conducting	Nelson	MUS	Assistant Professor	MUS	1	0.333	3
MU 205	Workshop: The String Quartet	Davis	MUS	Associate Professor	MUS	1	0.333	3
MU 299.07	Dissertation Research	Reynolds	MUS	Professor	MUS	1	1	3
MU 299.21	Dissertation Research	Kane	MUS	Professor	MUS	1	1	3
EC 149	Economics of Performing Arts	Marshall	MUS	Professor	ECO	0.5	1	3

Note: Course #: Course number.
DEPTINS: Department of the instructor.
DEPTOFF: Department sponsoring a course.
TEAM: Instructor's share of the teaching of a course.
PERHRS: Percentage of the hours per week of a course attributable to the instructor.
SHRS: Hours a course meets per week.
PHRS: Number of hours alllocated to an instructor for a class (SHARE × SHRS × (1-RDUM)).
PENR: Number of students allocated to an instructor for a class (TEAM × TOTAL ×(1-RDUM)).
GHRS: Number of hours allocated to an instructor for a graduate class.

TABLE 7A.1 (*cont.*)

PHRS	*PENR*	*GHRS*	*GENR*	*CRED*	*TOTAL*	*UNDER*	*GRAD*	*OTHER*	*GDUM*	*RDUM*	*SHARE*
3	21	0	0	3	21	21	0	0	0	0	1
1.5	7.5	0	0	3	15	15	0	0	0	0	0.5
1.5	7.5	0	0	3	15	15	0	0	0	0	0.5
3	33	0	0	3	33	33	0	0	0	0	1
3	25	0	0	3	25	24	0	1	0	0	1
1	7	0	0	1	7	7	0	0	0	0	1
0.5	1	0	0	3	1	1	0	0	0	0	1
1	2	0	0	3	2	2	0	0	0	0	1
3	13	0	0	3	13	12	0	1	0	0	1
1.5	6	0	0	3	12	10	0	2	0	0	0.5
1.5	6	0	0	3	12	10	0	2	0	0	0.5
3	3	0	0	3	3	0	3	0	0	0	0.75
1	3	0	0	0	3	0	3	0	0	0	0.25
2	18	0	0	3	18	15	3	0	0	0	0.667
1	10	0	0	0	10	8	2	0	0	0	0.333
1	8	0	0	0	8	7	1	0	0	0	0.333
3	2	3	2	3	2	0	2	0	1	0	1
1	9	1	9	3	9	0	9	0	1	0	1
1	6	1	6	3	6	0	6	0	1	0	1
0	0	0	0	3	3	0	3	0	1	1	0
0	0	0	0	3	2	0	2	0	1	1	0
3	7.5	0	0	3	15	13	1	1	0	0	0.5

GENR: Number of graduate students allocated to an instructor for a class.

CRED: Number of credit hours assigned to a course.

TOTAL: Total enrollment in a course.

UNDER: Number of undergraduates enrolled in a course.

GRAD: Number of graduate students enrolled in a course.

OTHER: Number of other students enrolled in a course.

GDUM: Equal to one if a graduate course; zero otherwise.

RDUM: Equal to one if course was dissertation research; zero otherwise.

SHARE: Share of a student's time spent in each section of a course.

students outside of class, working alongside graduate students in labs, reading student drafts, and grading assignments. Therefore, this measure is by no means a complete measure of "teaching load."

In calculating the basic measure, several modifications and assumptions, some of them rather arbitrary, were used.

1. In accordance with the usual convention used in describing teaching loads, the total number of hours for all courses taught over the course of the year are added together. In addition, courses taught in institutions using the quarter system are taken to be equivalent to courses taught in semester systems. Thus, a professor teaching two courses per quarter, each carrying three contact hours per week, would have a classroom teaching load of 18 hours; this load would be comparable to three similar courses per term in a semester system.

2. In cases in which actual hours per week and credit hours differ, measured hours are based on actual number of hours in class per week, or contact hours, rather than on credit hours.[13]

3. Team teaching is reflected by dividing hours (and enrollment) evenly among all listed instructors for the purpose of measuring classroom teaching loads. In most cases, this assumption seems to be a fair reflection of the actual teaching load per instructor. Occasionally, single instructors were listed for colloquia courses, which consist largely of invited presentations by invited speakers or graduate students enrolled in the course. Because these courses typically require significantly less time than do conventional lecture courses or seminars, the listed faculty leader of a workshop or colloquium received credit for one-third of the class time.[14]

4. One set of courses that required special attention were those designed to give credit to a student who is under the direction of a faculty member and who is engaged in a largely independent project; these courses may be called "advanced topics in . . ." or independent study. In some instances, some of these courses may be used to "try out" a new course that might later receive a more permanent course number and title. Although not normally conducted in classrooms, these courses require meeting time similar to that required by conventional courses, and so it is important to reflect their contribution to faculty teaching loads. Data on the number of contact hours between the professor and student simply are not available for independent study-type courses. Furthermore, data on the number of hours per week that a listed faculty member spent teaching students in a workshop or a dissertation research section are not available. Because of the difficulty in distinguishing the various possibilities, the calculations of course load in this study use the following arbitrary weighting system. Courses that were for-

mally designated as independent study or had the characteristics of a flexible course that might be used in the same way (courses of this type often had low enrollments) were designated "independent study-type" courses. Using a benchmark that an independent study course might require a professor to meet with a student for at least one hour every two weeks, a course was assumed to take up one-sixth of a three-hour commitment for each student enrolled, up to six students, beyond which the course was assigned a full three-hour credit. Thus, an independent study-type course in which three students were enrolled would be assigned a weight of 1.5 hours.[15]

The number of hours per week that a student spends in a class, designated *SHRS* in the table, and the number of hours that a particular instructor spends conducting the class are not necessarily the same. To accommodate this fact, variables were created describing whether the lecture, discussion, or laboratory portion of the class was team taught (*TEAM*, a variable showing an instructor's share of a team-taught course) and the percentage of the hours per week attributable to a particular instructor for an entire course, *PERHRS*. If a class is team taught, the percentage of the hours per week had to be allocated to the various instructors. For the present study, the hours per week were divided evenly among instructors in team-taught classes. For example, in the hypothetical team-taught Music Appreciation II class, each professor is allocated 50 percent of the class's hours per week.

5. Professors listed as leading dissertation research sections were given no credit for classroom teaching for such advising. For ease of calculation, a dummy variable was created, equal to one if the course is for dissertation research and equal to zero otherwise, as illustrated by *RDUM* in the example.

6. One other arbitrary rule used in the present study to calculate classroom teaching loads was to credit instructors and students with only one hour of class time for laboratory sections, in keeping with the practice of giving only one hour of credit for lab sections even though an instructor or student may spend as much or more time in lab than in lectures for a course.

Average classroom teaching loads were calculated for each department by dividing the total number of hours (or enrollments) by the number of faculty available for teaching each term or, where available, by the FTE number of faculty available. In cases in which FTE were not available, faculty were considered available for teaching in any semester during which they were not on sabbatical or other leave of absence. The data were not always sufficient to identify official leaves of absence, so, for institutions that did not have FTE in-

formation, faculty doing no teaching during a term were assumed to be on leave. However, no correction was made for reductions in teaching loads given for administrative duties; these reductions serve to reduce the total classroom teaching load without reducing the number of faculty FTEs available for teaching.

These assumptions are applied to the example in Table 7A.2. The product of *SHARE* (the share of a student's time spent in each section of a course), *SHRS*, and (1-*RDUM*) is an estimate of the number of hours per class attributable to each instructor, *PHRS*. The number of students per class allocated to each instructor, *PENR*, is equal to the product of *TEAM*, *TOTAL*, and (1-*RDUM*).[16]

As noted, the calculation of classroom teaching loads per class does not reflect time spent reading, preparing syllabi, preparing lecture notes, or meeting outside class with students. Because of the nature of graduate training, preparation for graduate classes often is more demanding on professors than is preparation for undergraduate classes. Thus, it is useful to distinguish between graduate classes

TABLE 7A.2
Average Classroom Teaching Loads per FTE and Course Characteristics: Hypothetical Example

Description	*Calculated Value*
Classroom Teaching Load	
Courses per week	
Total	7.67
Graduate	1.67
Enrollment	
Total	97.5
Graduate	17.0
Average Class Size	
Undergraduates	21.3
Graduate students	7.4
Percentage of Undergraduates Taught by	
Graduate students	3.7
Nonregular faculty	47.7
Subtotal	51.4
Percentage of Undergraduates enrolled, by Size of Class	
18 or less	42.4
19–35	57.6
36–75	0.0
More than 75	0.0
Total	100.0

Source: Calculations based on hypothetical figures in Table 7A.1.

and undergraduate classes when calculating classroom teaching loads. One mechanism for making this is to use a dummy variable to designate graduate courses. For instance, in the example, *GDUM* equals one for graduate-level courses and zero otherwise. The hours per instructor for graduate classes, *GHRS*, equals *PHRS* multiplied by *GDUM*, and enrollment per professor in the graduate classes is the product of *PENR* and *GDUM*.

After these variables were constructed, observations were summed, by professor. The sums of *PHRS*, *PENR*, *GHRS*, and *GENR*, by professor, show individual teaching loads. In this study, to calculate average classroom teaching loads by department, total classroom hours are divided by the sum of the department's faculty FTE. Average teaching loads for this case are translated from hours to courses, where three hours per week for a 14-week semester is one course.[17]

CLASS CHARACTERISTICS

Several measures are used to describe the courses taught in the sample departments in each institution. In contrast to the measures of teaching load, which are calculated from the perspective of regular faculty members, the class characteristics attempt to describe salient aspects of the course from the perspective of the enrolled student. As illustrated in Table 7A.2, four measures are calculated: (1) average class size for undergraduates; (2) average class size for graduate students; (3) the size distribution for undergraduate classes; and (4) the distribution of undergraduate enrollments, by type of instructor (regular faculty, nonregular faculty, and graduate students). Regular faculty are tenured or tenure-track faculty, usually having the rank of professor, associate professor, or assistant professor. Nonregular faculty include visiting instructors and instructors with such ranks as professor of the practice, lecturer, research professor, and artist-in-residence. Several aspects of the calculations are worth mentioning.

1. Average class size is weighted, as appropriate, by the number of undergraduates or graduate students enrolled in the course through the sample department. In calculating average class size for undergraduates in the philosophy department, for example, a course with 30 undergraduates who enrolled through the philosophy department, 3 graduate students, and 2 undergraduates who enrolled in the cross-listed course from another department would have a total class size of 35 and would receive a weight of 30. In calculating the average class size for graduate students in the department, the class would still be entered as 35 with a weight of 3.

2. Courses that meet in sections or labs in addition to lectures imply different class sizes and different instructors for different portions of the course, and these different meeting arrangements are weighted roughly according to the time spent. For example, a student in an introductory natural sciences course might spend two hours per week in a lecture with 235 students, one hour in a section of 28 students, and one hour (the official weight for what usually is more than one hour) in a lab with 22 students. If the section and lab are run by graduate students and the lecture is given by a professor in the department, this student sees a regular faculty member half the time and, on average, is in a class of 130 (.5 × 235 + .25 × 28 + .25 × 22). Lecture classes with sections and no labs typically imply a weight of three-fourths for the lecture and one-fourth for the section, although most core courses at Harvard met only twice per week in lecture, implying a two-thirds/one-third split.

In illustrating the calculation of these measures, it is useful to begin with a variable that defines the share of the student's time spent in each section of a course, as illustrated by the variable *SHARE* in Table 7A.1. If a course does not meet outside of the lecture and has only one instructor, *SHARE* equals one. If a course has two hours of lecture as well as a one-hour discussion section each week, then the share of a student's time for the course spent in lecture is two-thirds and the share for the discussion section is one-third.

The average class size for undergraduates enrolling in the courses of a given department, *UAVESIZE*, is obtained by calculating a weighted average of the class sizes for all the components of all the courses offered by that department, the weight being undergraduates who enrolled in that department's courses. This is formulated as the sum of the product of *SHRS* (credit hours), *UNDER* (the number of undergraduates in the course), *SHARE*, and *TOTAL* (the total enrollment, including graduate students and those enrolled in the course via another department or program), divided by the sum of the product of *SHRS*, *UNDER*, and *SHARE*, or

$$UAVESIZE = \frac{\sum_i SHRS_i * SHARE_i * UNDER_i * TOTAL_i}{\sum_i SHRS_i * SHARE_i * UNDER_i}, \qquad (7.3)$$

where i represents all of the n meetings of each undergraduate class. The denominator is the sum of undergraduate credit hours for all the department's courses, and this constitutes the weight for the average. The average graduate class size is calculated by using the students' total enrollment hours of each graduate course weighted by graduate enrollment.[18] In chapter 7, the average class sizes are calcu-

lated by the department offering the course (*DEPTOFF* in Table 7A.1). However, the identities of the departments used in the calculations are not revealed.

Another description of class size presented in chapter 8 is the distribution of undergraduate enrollment, by class size. This calculation is accomplished by sorting the total enrollment of undergraduates into four categories based on the total enrollment in each course or part of a course: (1) 18 or less, (2) 19 to 35, (3) 36 to 75, and (4) 75 or more. For each category, the sum of the product of *SHRS*, *SHARE*, and *UNDER* (in other words, undergraduate enrollment hours) is calculated and, in turn, the sum of undergraduate enrollment hours for each of the categories. The percentage distribution is equal to the product of *SHRS*, *SHARE*, and *UNDER* for each category divided by the sum of all undergraduate enrollment hours across all categories such that

$$\frac{\sum_j \sum_i SHRS_{ij} * SHARE_{ij} * UNDER_{ij}}{\sum_i SHRS_i * SHARE_i * UNDER_i} = 1, \qquad (7.4)$$

where j represents each category, one through four. This distribution approximates the proportion of a students' time spent in sections of different sizes.

Undergraduates' exposure to regular rank (tenure or tenure-track) faculty, to nonregular faculty, and to graduate students in the classroom was calculated by, first, summing the undergraduate enrollment in undergraduate classes by these three categories, and then, dividing the undergraduate enrollment hours for each category by the sum of all undergraduate enrollment hours. This reveals the portion of students' time spent in sections led by regular-rank faculty as distinguished from nonregular rank faculty and graduate students (if any).

Appendix 7.3

Data on Committee Membership

DATA ON FACULTY committee membership at Duke were obtained from the annual faculty census surveys described in chapter 7. These forms were circulated each term over the entire period covered by the sample years of the study. In each term, they asked faculty to list the active university committees and departmental committees on which they served. The responses of all regular tenured and tenure-track faculty in the four sample departments were recorded and tabulated. The data are imperfect, in that they rely on professors' own evaluations of which committees are sufficiently significant to merit listing or which may be otherwise incorrect. With a few exceptions, however, the responses of faculty are recorded as reported. Committees related to departments were classified as departmental, and those related to schools or colleges were classified as university-wide. In general, subcommittees were not counted, the exception being the executive committee of the faculty senate. Administrative positions, such as departmental chair, director of graduate and undergraduate studies, liaison with some outside group not involving a committee, advisor to an academic honorary society, or coordinator of some function, were excluded from consideration. However, all departmental chairs were credited with serving on their dean's council of chairs even if this committee had not been listed. Committee memberships that were not counted on the grounds that they were indistinguishable from other scholarly duties of professors included editorial boards, doctoral examination committees, committees to evaluate candidates for appointment or promotion, and administrative duties connected with professional associations. On the other hand, formally constituted search committees were counted because they normally involve at least some months of continuing administrative work.

TABLE 7A.3
Regressions Explaining Committee Membership at Duke

	Dependent Variable			
	Departmental Committees		*University Committees*	
Department				
A	2.35	(12.4)	−0.52	(1.7)
B	0.63	(3.3)	−0.91	(3.0)
C	0.57	(3.1)	0.34	(1.2)
(Omitted: D)				
Rank				
Full professor	0.08	(0.5)	0.92	(3.8)
Associate professor	−0.08	(0.4)	−0.24	(0.8)
(Omitted: Assistant professor)				
Year				
1981	0.31	(1.8)	0.14	(0.5)
1986	0.07	(0.4)	−0.23	(0.9)
1991	0.10	(0.6)	−0.43	(1.7)
(Omitted: 1976)				
Intercept	−0.01	(0.1)	1.45	(4.2)
R^2	.40		.14	

Source: Estimated regressions using unpublished data on committee membership in four sample departments at Duke.