DOCTORATE UNEMPLOYMENT AS RENT-SEEKING BEHAVIOR

by

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DOCTOR OF PHILOSOPHY

in

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Chapter 1
INTRODUCTION AND OVERVIEW

Introduction

Throughout the past decade, recipients of advanced academic degrees have had unusual difficulty in their search for suitable employment. In almost every discipline, market conditions are worse today than they were ten years ago, and in some fields unemployment rates have reached what can only be characterized as depression levels. If past and present conditions are not themselves cause for concern, the current level of graduate school enrollments makes it almost certain that the doctorate surplus will continue for at least several years into the future. The present study endeavors to explain the economic causes of that surplus. It argues that a large part of Ph.D. unemployment is the consequence of a setting characterized by monopoly rents and self-interested -- or "rent-seeking" -- behavior.

In what has come to be accepted by many economists as the most comprehensive analysis of the Ph.D. labor market, Richard Freeman presents "evidence suggesting that labor market forces do effect an

1Throughout this study no effort is made to distinguish between unemployment and underemployment. Underemployment exists when a part of an individual's abilities are unemployed.

approximate balance between supply of and demand for the highly educated... It is possible that Freeman is correct, but actual experience since the time his book was written (1971) suggests that he is not. One difficulty, as Freeman himself notes in a more recent work, is that jobs in the Ph.D. labor market are not homogeneous: conditions and terms of employment vary widely from one job to another. Casual evidence supports this view. Today approximately 50% of all new Ph.D.s who obtain jobs enter teaching, and if long waiting lists and the refusal by many graduates to accept nonacademic jobs are any indication, faculty incomes (all things considered) must exceed what Ph.D.s can earn in the private sector by a considerable margin.

It can be shown that if a labor market is segmented between more- and less-desirable jobs, then it is economically rational for a fraction of the labor force to remain unemployed and search for one of the more-desirable jobs. If it is true that jobs in academe are preferred to jobs elsewhere, then actual conditions should differ dramatically from the full-employment setting predicted by Freeman's analysis (which assumes that the desirability of all jobs is equal).

---


A History and Description of Doctorate Unemployment

Widespread unemployment among holders of Ph.D.s is a relatively new development, and arose soon after several forecasts of permanent shortages of doctorate manpower made in the mid-1960s. Indeed, the National Research Council, in its yearly Summary Report of the Survey of Earned Doctorates, began reporting statistics on new Ph.D.s "seeking but not finding employment" only in 1974; the issue was presumably not an important one before that time. If that was once the case, it clearly no longer is: over 21% of all (surveyed) doctorate recipients in 1977 were reported as without jobs, and over one-third of the graduates in some disciplines were seeking employment. Even these statistics do not indicate the full extent of the problem, for they exclude consideration of two groups who might have entered the "seeking employment" group had more jobs been available: those who were underemployed because they accepted jobs that required only a fraction of their qualifications, and those who entered postdoctoral study to escape unemployment.

6The following is an example of the optimistic predictions made in the late 1960s: "Because the structure of demand in both teaching and research is highly flexible, we will probably not need to develop new sources of employment for Ph.D.s before 1985. By that date, however, each arts and sciences area, except for the humanities, may be approaching the saturation point for doctoral level employment." John K. Folger, Helen Astin, and Alan E. Bayer, Human Resources and Higher Education (New York: Russell Sage Foundation, 1970), p. 74.

Especially hard hit by "the new depression in higher education" are Ph.D.s in the humanities. In 1969 unemployment rates among new degree recipients were of approximately the same magnitude in all the broad field groups (e.g., the humanities, social sciences, physical sciences), but by 1977 unemployment was considerably higher for the humanities than for the other groups.

Educators are alarmed at this turn of events. At the Modern Language Association's annual conference (1977-78), one session was titled, "Should Half the Ph.D. Programs Be Abolished?" Coming from an academician, that is a desperate question. The market for historians had deteriorated to the point where, in 1971, the number of Ph.D.s granted was "at least three times more...than...(the number of) teaching jobs available in four-year colleges." Some proposed to deal with the problem by undertaking a significant reduction in the number of degree-granting institutions; that proposal was not implemented and the problem still exists. Elsewhere, in philosophy, "there are seven applicants for every faculty vacancy...according to

8 This is the term applied to the current setting by David Breneman, Graduate School Adjustments to the "New Depression" in Higher Education (Washington, D.C.: National Board on Graduate Education, 1975).


a conservative estimate by the head of the American Philosophical Association placement committee.\footnote{Daniel C. Spitzer, "Ph.D.—The New Migrant," The Progressive, Vol. 40, No. 9 (September, 1976), p. 25.}

Turning from anecdotal evidence to a wider view of the problem, Tables 1 and 2 show what has happened to Ph.D. unemployment in recent years. From these data—two things are apparent: First, unemployment is worse in the humanities and in some of the social sciences than it is in most other disciplines; and second, unemployment is ongoing—not a phenomenon that can be explained as the result of short-run market fluctuations.

While these data provide only an imperfect indicator of what has happened to market conditions in the last few years, they are sufficiently detailed to impose at least two requirements on an acceptable explanation of Ph.D. unemployment. First, it must explain how unemployment can persist for such a long period of time: Why do individuals continue to pursue the Ph.D. when they know in advance how likely unemployment is? Second, it must discuss the factors that cause unemployment rates to differ so widely across disciplines: Why is the unemployment rate higher in, say, history than in economics?

**Alternative Explanations for Ph.D. Unemployment**

Many have looked at the doctorate labor market, but nearly all analyses fall into either of two broad categories: those that largely
### TABLE 1

Percentage of Surveyed Doctorate Recipients Seeking But Not Finding Employment By Broad Field Groups and Selected Disciplines, 1969-1976

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<td>13.0</td>
<td>13.5</td>
<td>13.1</td>
<td>13.4</td>
<td>12.6</td>
<td>12.7</td>
<td>12.6</td>
</tr>
<tr>
<td>Chemistry</td>
<td>9.6</td>
<td>12.0</td>
<td>11.7</td>
<td>12.2</td>
<td>12.1</td>
<td>10.1</td>
<td>11.0</td>
<td>10.0</td>
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<tr>
<td>Engineering</td>
<td>20.4</td>
<td>21.9</td>
<td>22.1</td>
<td>21.7</td>
<td>21.7</td>
<td>20.0</td>
<td>21.0</td>
<td>22.0</td>
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<tr>
<td>Social Sciences</td>
<td>13.9</td>
<td>14.8</td>
<td>14.3</td>
<td>15.0</td>
<td>17.0</td>
<td>18.2</td>
<td>20.3</td>
<td>21.8</td>
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<td>Arts and Humanities</td>
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<td>14.5</td>
<td>16.7</td>
<td>20.5</td>
<td>24.1</td>
<td>26.9</td>
<td>31.1</td>
<td>32.5</td>
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<td>Mathematics</td>
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<td>18.5</td>
<td>20.3</td>
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<td>27.8</td>
<td>23.8</td>
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<td>14.1</td>
<td>15.4</td>
<td>14.5</td>
<td>13.8</td>
<td>13.2</td>
<td>13.4</td>
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<tr>
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<td>17.3</td>
<td>19.4</td>
<td>20.1</td>
<td>20.8</td>
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<tr>
<td>Education</td>
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<td>22.1</td>
<td>20.7</td>
<td>21.5</td>
<td>22.4</td>
<td>22.5</td>
<td>23.4</td>
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TABLE 2
Percentage of Surveyed Doctorate Recipients
Seeking But Not Finding Employment In
Selected Disciplines and Broad Fields Groups, 1977

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Percentage</th>
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<tr>
<td>Chemistry</td>
<td>11.2</td>
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<tr>
<td>Other Social Sciences</td>
<td>23.5</td>
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<tr>
<td>Physical Sciences</td>
<td>13.1</td>
</tr>
<tr>
<td>English and American Language &amp; Literature</td>
<td>34.3</td>
</tr>
<tr>
<td>Mathematics</td>
<td>24.9</td>
</tr>
<tr>
<td>Foreign Language and Literature</td>
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<td>Life Sciences</td>
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<tr>
<td>Other Humanities</td>
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<tr>
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<td>Economics</td>
<td>16.2</td>
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<tr>
<td>Anthropology and Sociology</td>
<td>22.6</td>
</tr>
<tr>
<td>Political Science, Public Administration, and International Relations</td>
<td>21.7 TOTAL, ALL DISCIPLINES 21.3</td>
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ignore individual behavior and concentrate instead on forecasting overall demand and supply aggregates, and those that treat Ph.D. labor market as being little different from most other labor markets, with few distinguishing characteristics of its own. This section briefly reviews the two best-known theories of the doctorate labor market and notes several shortcomings in the explanations they offer for unemployment.

**Fixed-Coefficient Models.** Because they include little or no theory of individual behavior, the fixed-coefficient models are not so useful for understanding the doctorate labor market as they are for forecasting supply of and demand for manpower several years hence. These models are, as their name suggests, based on the assumption that certain trends from the past will continue to exist into the future. Surpluses or shortages are projected by finding the difference between supply and demand forecasts. Using these techniques, several analysts have projected the current surplus of Ph.D.s to last at least until 1990, and in some instances longer.12

Although more sophisticated versions exist, the following is typical of the fixed-coefficient models that have been so widely used in the last decade:13


Demand

A. Demand for faculty is equal to the product of total enrollments and the faculty-student ratio

1. Total enrollments are equal to the sum of undergraduates and graduate enrollments

   a. Undergraduate enrollments are equal to the sum of freshman, sophomore, junior, and senior enrollments. Freshman enrollments in year $t$ are equal to the number of individuals born in year $t-18$ multiplied by the probability of graduating from high school multiplied by the probability that a high school graduate will attend college. Sophomore, junior, and senior enrollments are equal to the number of freshmen in years, $t-1$, $t-2$, and $t-3$ multiplied by the probabilities of continuing in college for one, two, and three years after the freshman year.

   b. Graduate enrollments are equal to the number of seniors at the undergraduate level for the last $n$ years (where $n$ is the average number of years needed to complete the graduate degree) multiplied by the probability that a senior will graduate from college multiplied by the probability that a college graduate will attend graduate school.
2. The faculty-student ratio differs as between undergraduate and graduate study and by type of college (junior college, four-year college, and university).

B. Demand for researchers is equal to the product of R&D expenditures and the ratio of Ph.D.s to dollars of research expenditure.

C. Nonacademic, non-R&D demand is projected to grow at the same rate as it has in the most m years (m is a judgmental decision).

D. Replacement demand is equal to death plus retirement rates multiplied by the number of Ph.D.s.

**Supply**

Supply in year t is equal to the product of first-year graduate enrollments in year t-n multiplied by the probability that a first-year graduate student will receive the Ph.D.

Finally, it is important to note that all probabilities and rates are assumed constant over time unless circumstances justify judgmental adjustments "to keep results in the realm of contemporary wisdom."14

This class of models is subject to a number of criticisms,15 most important of which is the fact that they ignore the importance of individual behavior in influencing outcomes. To be more specific, the coefficients that are assumed to be constant over time are, in fact,

---


variable to the extent that individual decision makers respond to changing economic conditions. If, for example, the Ph.D. unemployment rate suddenly rises, one would expect the proportion of college graduates continuing on to graduate study to decline—and over time this response will act to reduce the size of the surplus. Second, the fixed-coefficient models are generally used to forecast the aggregate supply of and demand for Ph.D.s, thereby ignoring factors which affect supply and demand in the various disciplines. Third, no mention is made of wages or prices in the analysis, either because they are assumed constant or because individual behavior is assumed to be unresponsive to changes in either.

This last point has direct relevance to the recent difficulty the fixed-coefficient models have had in forecasting market conditions, as can be seen in Figure 1. Suppose the demand for labor falls from $D_0$ to $D_1$. If it is assumed that wages are constant when in fact they are flexible, the forecast is for employment to fall from $Q_0$ to $Q_2$ rather than from $Q_0$ to $Q_1$. If there is any wage flexibility whatever, the actual surplus of labor will be less than the fixed-coefficient models project.

Finally, analysts are uncertain as to what coefficients they should assume will remain constant: Is it the proportion of college graduates entering graduate school that will remain unchanged, or is it the rate of growth in this proportion that is constant? Similar questions are relevant for all coefficients, and the actual forecast may vary substantially depending on how those questions are answered. Because
FIGURE 1

Market Response to A Decrease in the Demand for Labor Services
of these difficulties it has been necessary for analysts to make a number of "judgmental adjustments" in their models—perhaps not so much to keep the results within the realm of contemporary wisdom as to account for the effects of changing market conditions.

Freeman's Model of Incomplete Adjustment. In contrast to the fixed-coefficient models, the incomplete adjustment model assigns a major role to wages and prices and is based on the assumption of individual utility maximization. What Freeman sees as the two most critical aspects of the doctorate labor market are the long time period required to produce a Ph.D. and the difficulty individuals have in estimating the incomes they will earn in the future in various occupations. Freeman adds these two "twists" to the conventional supply and demand model to produce what he calls his model of incomplete adjustment—where Ph.D. income and employment "approach but fail to attain (full) equilibrium for several periods of time." During the period of incomplete adjustment the market is said to be in disequilibrium and there is either a shortage or a surplus of doctorate manpower.

These points are illustrated in Figure 2. Beginning from a point of full equilibrium (A), suppose that the demand for Ph.D.s in a discipline falls from \(D_0\) to \(D_1\). In the first instance, supply is fixed at \(Q_0\) due to the time requirement in production, so wages fall from

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FIGURE 2
Graphical Representation of Freeman's Model of Incomplete Adjustment
$W_0$ to $W_1$ to restore short-run equilibrium to the market (point B). This fall in the wage will cause estimates of future wages to fall, leading to a reduction in the quantity of labor services supplied in the next period. How much supply falls is determined by how much wages are expected to fall in the future following the wage adjustment from $W_0$ to $W_1$, by the responsiveness of labor to changes in the expected wage, and by the length of the production period. In any event, supply will fall below $Q_0$ and the wage will rise slightly above $W_1$; this iterative process is repeated in subsequent periods until the new full equilibrium at point C is attained. There is an interval of time between the original fall in the demand for Ph.D.s and the market's complete adjustment to it. During this period of incomplete adjustment the actual quantity of labor services supplied is greater than $Q_C$ (the quantity that will be supplied at the new long-run equilibrium), so Freeman terms this a surplus market.\footnote{While free of technical errors, this theory is flawed by its failure to capture certain essential characteristics of the Ph.D. labor market. It is true that the production period for doctorates is long and that it is difficult for individuals to estimate the incomes they will earn several years hence. However, Freeman fails to capture the role of adaptive expectations in labor market dynamics. See fn. #16, p. 19.}

While free of technical errors, this theory is flawed by its failure to capture certain essential characteristics of the Ph.D. labor market. It is true that the production period for doctorates is long and that it is difficult for individuals to estimate the incomes they will earn several years hence. However, Freeman fails to capture the role of adaptive expectations in labor market dynamics. See fn. #16, p. 19 for Freeman's definition of surplus and shortage. Note that his definition of a surplus market is not one in which unemployment exists.\footnote{See fn. #16, p. 27 for Freeman's definition of surplus and shortage. Note that his definition of a surplus market is not one in which unemployment exists.}
to consider the implications of having a market where one group of employers operates to earn a profit and another group does not. He indirectly addresses this issue in later studies,\textsuperscript{19} but even then does not go on to consider in detail what role this complication plays in contributing to unemployment.

That being the case, a synthesis is required, a new model of the Ph.D. labor market that includes both individual utility-maximizing behavior and an institutional setting in which not all employers are privately-owned, for-profit organizations. This dissertation provides that model. The following section summarizes the argument to be presented in later chapters.

**Ph.D. Unemployment and Institutions: A Summary**

In recent years, a growing number of economists have contributed to a field that has come to be known as "the economics of property rights."\textsuperscript{20} This approach takes the individual as the basic unit of analysis and assigns to him the goal of personal utility maximization. From that foundation, analysts construct theories of individual behavior—and, therefore, of organizational behavior, since individuals


\textsuperscript{20}A survey of the property rights literature can be found in Eric Furubotn and S. Pejovich, The Economics of Property Rights (Cambridge, Mass.: Ballinger Publishing Co., 1974).
ultimately decide what organizations will or will not do—under a wide range of circumstances. Circumstances are critical to the analysis since they constrain or limit the individual decision maker's ability to increase his utility, and are the counterpart to what in microeconomic theory is referred to as the budget constraint. Changes in the institutional setting affect the relative cost of engaging in various activities, and by doing so influence the behavior of individuals and the organizations for which they work.

These points are important for understanding decision-making in academe. Chapter 2 provides the background for analysis by discussing the events that were important in shaping the present institutional setting. Chapter 3 goes on to consider policy-making in academic organizations in this setting from a property rights perspective, and concludes that the not-for-profit arrangement adopted by colleges more than three centuries ago has the effect of reducing incentives for managerial efficiency and of stimulating the demand for institutional prestige. The former is responsible for causing faculty salaries to exceed profit-maximizing levels by reducing the effort "owners" of colleges (taxpayers and donors) and their representatives (legislators, trustees, and administrators) put into searching out and instituting least-cost production techniques. The exaggerated demand for prestige will also contribute to salary excesses by causing individual colleges and universities to make wage offers high enough to attract high-quality faculty away from other colleges. The expected result is that salaries paid to college faculty will exceed salaries
paid to individuals with doctorates employed in the private for-profit sector when both pecuniary and nonpecuniary components of income are considered.

The next step toward understanding Ph.D. unemployment is to analyze the effects that this wage differential has in the doctorate labor market. That is the purpose of Chapter 4. Fortunately, economists have investigated the role wage differentials play in other markets, and much of what they have had to say is relevant here. The chapter begins by postulating the existence of a market that is for institutional reasons segmented between more- and less-desirable jobs (i.e., between academic and nonacademic jobs). Those not employed in the preferred sector would, by definition, like to be, and are therefore willing to invest resources in improving their chances for preferred employment. This investment activity has been referred to elsewhere as rent seeking. Competition between those who would like to

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"move" will cause this investment at the margin to equal the present
discounted value of the intersectoral income differential.

What makes these points relevant to the present discussion is
the forms that the investment in search might assume. One is the up-
grading of qualifications, in particular a decision to undertake one
or more years of post-doctoral study because of the belief that
employers in the preferred sector will be more likely to hire
applicants who are more highly qualified. A considerable amount of
this type of investment is undertaken by those in the Ph.D. labor
market, but since financial support is for the most part limited to
those in the physical sciences, it is in those disciplines that most
post-doctoral work is undertaken. A second, and for present purposes
more relevant, form of rent seeking is accepted unemployment in order
to increase the amount of time and energy that can be devoted to
finding one of the more-desired jobs. The decision to remain unemployed
may at first appear to be an economically inefficient means of getting
a job, but when one considers how low salaries are in the nonacademic
sector for those in certain disciplines and the subsidy to job search
provided by unemployment compensation, it seems less so. Ph.D. un-
employment, then, can at least in part be explained as the result of
utility-maximizing behavior by suppliers in response to conditions
originating from the demand side of the market.

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23 This is not meant to imply that rent seeking is the only reason
for undertaking post-doctoral study. It may be only one of many.
Finally, this chapter explains why unemployment is so much worse in some disciplines than it is in others. Put simply, the more rent there is in a market, the more rent seeking there will be; the larger the intersectoral wage differential, the more unemployment. As it turns out, there is a pronounced tendency for salaries in academe to equalize across disciplines but less of a tendency for them to do so in the nonacademic sector. It follows that rent, and therefore rent seeking and unemployment, will be large in disciplines where private sector wages are low, and vice versa.

Other chapters can be summarized more briefly. Chapter 5 restates a number of propositions arrived at in previous chapters and then subjects them to empirical testing. Chapter 6, the concluding chapter, discusses implications of the analysis and considers possible suggestions for institutional reform.
Chapter 2

ACADEME IN AMERICA: DESCRIPTION AND HISTORY

Introduction

As noted in Chapter 1, the position taken here is that Ph.D. unemployment is the consequence of certain peculiarities in the institutional design of academe. Before analyzing the impact of institutional arrangements, however, it is appropriate to first discuss what those arrangements are and why they were adopted. Chapter 2 does both.

The following section provides background information on the administrative structure of most American colleges and universities and on the individuals and groups who shape academic policy. It is followed by a brief history of academe from an economist's point of view. That history discusses the reasons colleges originally adopted the nonprofit organization form, explains the events surrounding the shift of power within colleges from trustees to faculties, and questions the usefulness of the nonprofit type of college in today's setting.

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1By institutional design is meant the rules, customs, and practices which are a persistent element in the culture of academe.

2Henceforth, no effort is made to distinguish between colleges and universities except where noted.
The Structure of Academe

In laying the foundation for a discussion of academic policy making, it is important to begin by stating what a college is: a legal entity designed to provide a setting for the production and dissemination of knowledge. The college is not, therefore, the subject of microeconomic analysis, since an organization does not itself make maximizing decisions. These are made by the individuals who compose the organization. Academic policy can be understood and explained only by examining the forces that act on the individuals who make decisions for colleges.

The present section serves as a prelude to analysis. It discusses the various groups which operate within the academic environment and describes the administrative structure adopted by most of the more than 2000 colleges in this country today. Except where noted, all comments apply to both private and public colleges.3

Groups Within Colleges. Trustees. At the top of the organizational hierarchy is a governing board usually known as the Board of

Trustees or Board of Regents. Virtually every college has such a board, and it bears ultimate legal responsibility for everything which takes place within the institution. At least in theory the duties and responsibilities of the board are usually understood to include:

1. Determination and establishment of the fundamental policies of the institution;

2. Selection and appointment of the president, and the delegation to him of powers commensurate with his responsibilities;

3. Preservation of the capital assets and the financial integrity of institution;

4. Service as a board of review of the actions of the administrative officers; and

5. Appointment of members of the faculty.

Boards of trustees have an average of fifteen members, many of whom are drawn from the business community and from the legal profession. The manner of selection depends on the nature of the college's charter: Trustees of private colleges are in most instances chosen by existing trustees, making the board a self-perpetuating body; trustees of public colleges are usually selected by the chief executive of the taxing area in which the institution is located. Members of governing boards seldom

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receive monetary compensation, and serve either out of a sense of civic duty or for the prestige which accompanies the position.

Administrators. Administrators are the "managers" of colleges, and are in charge of its day-to-day non-research, non-teaching activities. The head administrator is the president. His responsibilities include interpreting the broad policies made by trustees, delegating authority to his staff so that those policies become practice, securing financial support for the college's activities, and providing leadership whenever and wherever it is needed. The president is appointed by the trustees—usually after they consult with the faculty—and answers to them regarding the performance of his duties. In practice the president is often a former educator with a degree in either the humanities, the social sciences, or education.5

Responsibility for the management of the academic program in most colleges is delegated by the president to the second-ranking administrator on campus—whose title usually will be academic vice president, dean of faculties, provost, or chancellor. This individual is in charge of coordinating and supervising the activities of various schools, colleges, or academic divisions within the institution. Among his other responsibilities, the academic vice president is responsible for allocating funds for faculty salaries between schools within the

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university; only in small colleges or in important cases will this administrator involve himself in specific hiring decisions, however.

Below the academic vice president in the organization are the deans of the individual schools or divisions. They are expected to coordinate and supervise the academic departments within their respective jurisdictions. Among their other activities, deans allocate funds for salaries among departments, and often must consent to job offers or salary increases before they become effective.

The Faculty. The faculty are those within a college who are directly involved in research or instruction. Those faculty members who work within a particular field of study are usually organized as an academic department, although a certain amount of teaching and research can be expected to cross departmental boundaries. Each department is headed\(^6\) by an individual who is responsible for managing (coordinating, supervising, and controlling) activities within his department. Both faculty member and administrator, this individual is normally involved in all department-wide concerns; his duties usually include arranging teaching schedules, proposing changes in the curriculum, recommending salary changes for members of his department to the administration, and recruiting new faculty members. Departmental decisions (including those on new appointments and on promotions) are

\(^6\)This individual is the department head if he has been appointed by the administration, and the department chairman if he has been chosen by the members of his department.
made either by the head or by the department as a whole—in which case it may be that only tenured faculty are allowed to vote. In some instances these decisions must be approved by a member of the administration (usually a dean).

**Groups Outside Colleges.** Outside of colleges are two groups who are potentially important in the academic policy making process. It is they who provide the bulk of the financial support going to higher education, so their preferences (when "backed" by a willingness to provide or withhold resources) constrain the activities of colleges within certain limits. The following is a brief discussion of these two groups.

**Taxpayers—voters.** One group of individuals—taxpayers—provides financial support for the operation of many organizations, including both public and a number of private colleges. A slightly different group—voters—indirectly decides how tax monies will be spent by voting for and electing certain individuals to represent their interests. Elected representatives, in turn, are responsible for appropriating funds for various uses (including the provision of higher education) and for supervising the actual spending of funds after they have been

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7See, for example, "New York Legislature Must Make Crucial Decisions on City University," *The Chronicle of Higher Education*, Vol. 17, No. 16 (December 18, 1978), p. 1. The City University of New York is seeking additional financial aid from the state government, and in exchange the state government is increasing its control over the college's operations.
distributed to the recipient agencies. The official who ignores either responsibility will presumably be held accountable by voters who stand to benefit from increased efficiency within organizations which spend public funds.

Donors. An individual who voluntarily provides funds to a college to support certain of its activities is known as a donor. At times donors provide funds to promote some particular objective, but more often their intention is simply to support some college's efforts to provide the undefined good "higher education." An important group of donors are those individuals who once attended or graduated from a college and subsequently wish to support it; these are the college's alumni. Donors are seldom explicitly represented on boards of trustees, but alumni often are.

An Economic-Historic Survey of the American Institution of Higher Education

The first public college in the U.S. was the University of Georgia, an institution chartered in 1785, though it was not to receive on-going public support until 1875. This pattern was typical. It was not until "after the Civil War that the states began to...assume the obligation for continuous support of their universities." Since by

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8 This section follows closely the history of American higher education found in Henry G. Manne (ed.), The Economics of Legal Relationships: Readings in the Theory of Property Rights (St. Paul: West Publishing Co., 1975), chapter 35.

that time private colleges had been in operation for nearly two and one-half centuries, founders of nineteenth century public colleges nearly always adopted the organizational arrangements they observed in the older institutions. The origin of the organization form found in most present-day colleges, then, can be traced back to the colonial era. Why this nation's first colleges were established on a not-for-profit basis requires an investigation of the conditions present at that time. That investigation begins in 1636 with the founding of America's first college: Harvard.

Harvard college was intended by residents of Massachusetts to provide a center for training religious leaders for the American colonies. A for-profit arrangement was precluded from the outset since the private demand for higher education was not sufficient to support a profit-seeking college. Thus Harvard was set up on a not-for-profit basis, with students paying only a fraction of the cost of their education and the remainder coming from both the church and the community. At the time most members of the community were deeply religious individuals who were active in the church, so both groups of donors were in agreement that Harvard should concentrate on training ministers and that it should impart on all other students a set of religious values.

The original intention of Harvard's founders was "to emulate the governmental conditions of the English colleges with which they were
familiar.... Oxford and Cambridge were governed by their faculties and outsiders normally played no role in academic governance. When Harvard opened its doors in 1636, however, conditions believed to be necessary for self-government were not present, so the college was placed under the control of an outside board of overseers made up of six ministers and six magistrates. Although many considerations lay behind the decision to vest ownership and control in an outside board of trustees, important among them was the desire to ensure that the education actually received by students conformed to what donors intended rather than what an independent faculty might have preferred. A similar line of reasoning caused basically the same arrangements to be adopted by William and Mary (the nation's second college), and by later colleges as well.

To describe conditions in the colonial colleges is relatively simple. Tuition revenues provided only a small part of the funds required to finance higher education, so donors were in a position to control the quality and type of education produced. This they did by appointing their representatives as trustees, and trustees in turn

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managed colleges so as to achieve a single goal: maximization of the amount of religious training produced with a given quantity of resources.\(^\text{12}\)

The eighteenth and nineteenth centuries saw the emergence of a second trend in American higher education—a trend not altogether different from the one just discussed. During this period, many believed that the primary function of colleges should be to cultivate a special class within society: Students educated in a "common core of central knowledge" would become gentlemen, members of a "community of the educated."\(^\text{13}\) Individuals of this persuasion were both willing and able to subsidize colleges sympathetic to their beliefs. The result was the establishment of a number of upper-class, liberal arts colleges that offered a curriculum largely composed of Latin, Greek, mathematics, logic, and moral philosophy—subjects not usually pursued by students whose needs are mainly vocational and whose resources are quite limited. Again, as earlier, colleges catered to the demands of customers—i.e., outside donors—who were willing to purchase a specific type of education for others. Since a significant fraction of the funds

\(^{12}\)At this time, college instructors had almost no control over the content of the courses they taught. Many were told exactly what to teach and how to teach it. This point is made by Morton A. Rauh, College and University Trusteeship (Yellow Springs, Ohio: The Antioch Press, 1959), p. 75.

flowing to higher education came from donors, they had considerable influence over the type and quality of education colleges offered. This influence was usually indirect; donors with specific interests to promote placed their personal representatives on boards of trustees, and those representatives guided academic policy towards whatever ends were sought.

To summarize the general state of affairs which prevailed in most American colleges until about 1880, one can perhaps do no better than to quote an observer who has written that

All in all...there was a fairly neat package, in which university donors caused the kind of education they wanted for certain students to be produced and the entire institution was managed to that end.... 14

In that setting, the nonprofit, control by an outside board of trustees arrangement provided the most direct means by which colleges could respond to the demands placed on them.

If the dependence of colleges on donors for financial support made it possible for the latter to control academic policy, one should expect that if alternative revenue sources became available, then the influence of donors would wane. Substantial public revenue for colleges became available in the latter half of the nineteenth century when Congress passed the Morrill Acts of 1862 and 1890 and state governments began to

14 Manne, (ibid.), p. 618 (italics added).
provide ongoing support to public universities after 1875. Both developments reduced the need of colleges for donations, and academic policy began to reflect to a lesser degree goals chosen by donors.

That is not to say that control of colleges moved from donors to governments, however. While the language of the bill which established the so-called "land-grant" colleges was quite specific in requiring recipient institutions to teach a few well-defined subjects—agriculture and the mechanical arts—those who held a broader interpretation argued (convincingly, as it turned out) that colleges should be encouraged to do many other things as well. By 1890 the author of the bill (Congressman Morrill) was quoted as saying that the land-grant colleges should teach "all the learning demanded by any proportion of the American people."\(^{15}\) What this has meant in practice is that colleges became free to select their own goals; today, the land-grant colleges as a group "do not agree on any single or closely similar statement of their aims."\(^{16}\)

It was near the start of the twentieth century that the modern college began to emerge. Institutions retained their not-for-profit form because of inertia and the political desirability and economic feasibility of offering free or below-cost tuition, broadened the range


of goals they pursued, and gained increased autonomy from outside control when later developments changed the nature of academe and improved the financial position of colleges.

The first of these developments took place in the late 1800s when colleges—in the German tradition—began to devote relatively more resources to the production of new knowledge (i.e., research) and relatively fewer to the transmission of existing knowledge (i.e., teaching). This shift in emphasis is particularly noticeable with the founding of Johns Hopkins University in 1876. The potential significance of this change in direction is great. Research is by its nature a creative activity, and since creativity is difficult to supervise and even more difficult to measure, placing more importance on research had the effect of reducing the amount of control trustees and administrators could exercise over faculty members.

The increased attention given to research had still another impact on faculty autonomy. For perhaps the first time in modern history, academics were able to provide a service—research—that was demanded by those outside the university community. Selling this service, both to governments and to private users, reduced faculty dependence on incomes from teaching and made them less subject to trustee control.17

17 The availability of an outside source of income is likely to cause academicians to become what Tullock calls "barons." Barons, because they are less dependent on rewards from their superiors, are able to act in ways that their peers cannot. See Gordon Tullock, The Politics of Bureaucracy (Washington, D.C.: Public Affairs Press, 1965), p. 113. For a sociologist's explanation of how the increased emphasis on research has enhanced faculty autonomy, see Burton R. Clark, "Faculty Organization and Authority," in Gary L. Riley and J. Victor Baldridge (ed.), Governing Academic Organizations (Berkeley: McCutchan Pub. Co., 1977), pp. 64–75.
Finally, the autonomy of colleges and their faculties was increased by the introduction of the personal income tax. In 1917, congress authorized deductions of charitable contributions from gross income, and this encouraged donations to nonprofit institutions of higher education.\(^\text{18}\) This change, by reducing the personal cost of charity, increased both the number of donors and the total amount donated.\(^\text{19}\) The increased number of donors reduced the impact any one donor could have on academic policy; to the extent that "new" donors held different views on education than earlier ones, increased numbers probably also caused colleges to aim at a wider range of goals. Similarly, the increased total value of donations made colleges less dependent on any donation of a given size and, therefore, diminished the influence a single donor could exert on academic policy.

By way of summary, it may be said that conditions today are dramatically different from those which led to the original adoption of arrangements found in American colleges. The earlier setting was one where a relatively small group of donors both funded colleges and directed them to pursue a few specific goals. This was accomplished with the nonprofit trust organization form, an efficient arrangement in


the sense that it was conducive to maximizing the production of the type of education desired by those who financed colleges.

While the nonprofit trust arrangement is still prevalent in American higher education, conditions have changed so much that it may no longer be appropriate. Formal authority is still vested in trustees, but they are no longer the representatives of a like-minded group of donors as in years past. Agents for virtually everyone, trustees today are expected to represent a number of different points of view—some of them opposing. This makes consistent policy-making almost an impossible task. That problem, in conjunction with the growing importance of research, has reduced the ability of trustees to control colleges and has added to faculty autonomy. Some of the consequences of this shift in the control of colleges—in particular, those relating to efficiency—are the subject of Chapter 3.

The point that faculty dominate decision-making in academe has been made by many. The U.S. Court of Appeals (2d district), in regard to the governance of Yeshiva University in New York, noted that the faculty "has initiated, and the administration has repeatedly accepted, major policy determinations which constitute the essence of the University's venture." This case is discussed in detail by John H. Bunzel, "College Professors: Do They Have Managerial Status?" Wall Street Jour., Vo. 192, No. 63 (9/29/78), p. 24. One observer of academe has gone so far as to suggest that "the campus is a government of professors, for professors, and by professors." Pierre van den Berghe, Academic Gamesmanship (New York: Abelard-Schuman Ltd., 1970), p. 23. Not much different are the views of Russell Kirk. He "suspect(s) that far too many colleges exist merely for the sake of existing.... (W)hy do such institutions continue to exist—big ones, little ones, independent ones? Why, to pay salaries to administrators and professors." See "Deflating Grades," National Review, Vol. 30, No. 47 (November 24, 1978), p. 1483. This is in contrast to conditions at an earlier point in history. In the Dartmouth College Case in 1819, the courts "confirmed the dominant role of the college trustee in American higher education," according to Gerald P. Burns, (ibid.), p. 5. At the start of the twentieth century, Cattell wrote that the role of trustee was so strong as to be "utterly subversive of a true democracy." J. McKeen Cattell, University Control (New York: The Science Press, 1913)p.14.
Chapter 3

PROPERTY RIGHTS AND THE THEORY OF THE FIRM

Introduction

If it is indeed true that decision-making power in academe has shifted away from trustees and toward faculty, the result should be that policy decisions are based less on the goals of trustees (and donors) than previously and more on the goals of faculty. The purpose of the present chapter is to consider that hypothesis in more detail.

To do that, it is convenient to construct a simplified theory of the firm and apply it to colleges. In colleges, as in other firms, the performance of employees is affected by the constraints managers impose on their activities, the performance of managers depends upon constraints placed on their behavior, and so on up the administrative hierarchy. This network of authority will be more or less efficient according to the severity of constraints and the amount of resources that owners invest in enforcing them. The behavioral assumption here is that individuals seek to maximize their personal utilities. Consequently, employees will normally try to be inefficient and owners will try to reduce employee inefficiency. Economic analysis suggests that both the imposition of constraints on employees and the degree to which those constraints are enforced can be predicted by knowing the

1Efficiency here is defined as producing a given level of output at least cost.
incentive that owners have to undertake such activities. These incentives are generally understood to depend on custom, law, and the ownership arrangements present in the firm.

To briefly summarize what is to follow, firms having different ownership arrangements are examined to determine whether those established for the purpose of earning a profit can be expected to be more or less efficient than firms established for some other purpose. Of particular interest is whether for-profit firms will pay the same wages as their not-for-profit counterparts.

Efficiency in For-Profit Firms

Imagine a college owned and run by a few individuals whose purpose is to earn a profit. Those individuals, like entrepreneurs in other (i.e., noneducational) firms, are interested in the operating efficiency of their firm because a reduction in costs directly adds to their private wealth. To the extent individuals seek greater personal wealth, owners will seek to stimulate efficiency by undertaking the costly

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3 At this time, one must imagine that such a college exists because in fact none do (in the U.S.). This is apparently due to a bias of accrediting agencies who refuse to certify the academic programs of for-profit colleges regardless of other considerations. See an interesting discussion of this topic in James Koerner, "The Case of Marjarie Webster," *Public Interest*, No. 20 (Summer, 1970), pp. 40-64.
activities of defining what is expected of employees (faculty and administrators), monitoring employee behavior, and punishing (or rewarding) unacceptable (or desirable) behavior.4

Owners are able to control costs in either of two ways. First, they can themselves monitor costs and evaluate them according to information available elsewhere. This includes comparing salaries paid to employees with those which prevail in the private market. The incentive to do this is great, for even a small reduction in salaries implies a large increase in profits in a labor-intensive firm.5

Alternatively, owners may not be well informed about market conditions and such matters. So, rather than directly manage the firm, they may choose to hire an agent—an administrator or governing board—to do so in their behalf. To ensure that the agent has an interest in promoting efficiency, owners may decide to reward him in proportion to his

4These activities will be undertaken to the point where the additional outlay required to further reduce inefficiency is just equal to the reduction in costs it implies. This condition will prevail in all types of organizations, and not only in for-profit firms.

5To take a simple example, suppose a college has 200 faculty members, each of whom are paid an average of $18,000 annually. Total faculty salaries per year amount to $3.6 million. If salaries are only three percent above market clearing, then reducing them by that three percent would add $108,000 to profits each year. If the firm has 1000 owners, this amounts to an average of $108 per owner.
productivity. Bonuses and stock options are two possibilities. Thus whoever is responsible for compensating employees will suffer a reduction in his private wealth if salaries exceed the minimum that employees would accept. The prediction then is that salaries paid by for-profit firms will depart only slightly, if at all, from those which clear the market; efficiency in other areas of cost control is also expected.

The tendency for salaries paid by for-profit firms to approximate market-clearing levels is reinforced by the possibility of buying and selling stock. Suppose a college is owned by a group of individuals who, for one reason or another, are unable to operate it efficiently. Profits, and therefore the price of stock in the college, will be depressed. This presents the possibility of a takeover. In a takeover, outsiders hope to profit by (a) buying up a controlling interest in the firm, (b) replacing inefficient employees and operating procedures, and (c) selling their ownership in the firm once efficiency, profits, and stock prices have risen. Inefficiency within profit-seeking firms, then, is limited not only by the self-interested behavior of owners but also by the self-interested behavior of outsiders when there is an opportunity to transfer ownership rights (stock) in the firm; this opportunity is present in most large for-profit firms.

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6 This method of compensating corporate executives is common. See the "Annual Survey of Executive Compensation," Business Week, No. 2585 (May 14, 1979), pp. 79-107.
Efficiency in Government Firms

Next, consider the operation of a government-owned ("public") college. In this instance, ownership is vested in all residents of the political jurisdiction within which the college is located, rights to ownership cannot be bought and sold, and the college's objective is something other than profit. Institutional arrangements found in public colleges were discussed in the previous chapter: Owners are directly represented by elected officials who appoint a governing board to supervise the college's operations; that board in turn delegates much of its responsibility and authority to employees (administrators and faculty). In this setting, what predictions can be made about efficiency within the firm?

Before answering this question, it should be clear that although here the firm's objective is not profit, its ability to achieve other goals is maximized when employees are paid no more than the market-clearing wage. Owners of public colleges, then, desire the same salary policy as the owners of for-profit colleges. The issue is whether ownership arrangements or other aspects of the institutional setting prevent public colleges from implementing that policy.

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7That is, goals other than improving the living standards of employees.

8The first-order conditions for profit maximization are the same as those for cost minimization. See James M. Henderson and Richard Quandt, Microeconomic Theory (New York: McGraw Hill, 1971), chapter 3.
As before, the analysis will begin by examining the incentives decision makers have to promote efficiency. The decision makers now include elected representatives and faculty as well as owners and theory agents within the firm (i.e., members of the governing board and administrators).

Owners. Although the owners of government firms are like the owners of for-profit firms insofar as both prefer efficiency to inefficiency, they exist in a different environment and will therefore behave differently. An example should illustrate this point more clearly.

Suppose that a college with 200 faculty members who are paid an average of $18,000 each reduces salaries by three percent. The total cost reduction will be $108,000. For the private firm with 1000 owners, this translates to a yearly gain of $108 per owner; but for the public college with, say, one million owners, the average annual gain is less than eleven cents per owner. The owners of the private college clearly have a greater incentive to invest resources in keeping the firm operating at maximum efficiency than do the owners of the public college.

In fact, the average state population is over 4,400,000 while the largest private corporation in the U.S. has about three million owners and the ten corporations having the largest number of owners average about 787,000 owners, according to a pamphlet issued by the New York Stock Exchange. See New York Stock Exchange, "You and the Investment World" (New York: New York Stock Exchange, 1976), p. 5.
Indeed, the latter are nearly indifferent as to whether or not salaries are reduced. Compounding the effect of this large-number problem is the uncertainty taxpayers face: Even if costs are reduced, who receives the proceeds? A per-capita disbursement is possible, but not likely. Owners of public firms must estimate their share of the gains from cost reductions, and the variance they attach to such estimates will diminish their interest in efficiency and involvement in government policy.

More generally, Anthony Downs and Gordon Tullock have pointed out that because of large numbers, majority rule, and uncertainty, voters have almost no economic incentive to either obtain information about public policy issues or to vote even if information has been gathered.

The inability of owners to transfer ownership in government firms is also important. When shares are distributed equally among all members of the population and cannot be exchanged, individuals are prevented from specializing as owners in firms about which they have relatively

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10 Berle and Means are generally given credit for pointing out the consequence of widely disbursed ownership in the firm. The term they applied to this phenomenon is "separation of ownership and control." See A. Berle and G. Means, The Modern Corporation and Private Property (New York: Macmillan, 1933).


more knowledge. The decisions of owners will therefore be less in-
formed than if ownership were concentrated among those with expertise
on academic matters, so inefficiency is a predictable result of the
ban on share transfers. This problem is present also in private firms
to the degree that knowledgable individuals lack funds to purchase
stock. However, ownership in private firms can be held by those in any
political jurisdiction; consequently, expertise is available for
directing the private firm's operations that would not be available
if owners had to reside in a specific geographic area (as they must to
own a public firm).

Perhaps more importantly, the inability to transfer ownership in
public firms directly reduces the benefit taxpayers receive from
increased efficiency as compared to that received by owners of private
firms. Any permanent reduction in production costs implies a permanent
reduction in required taxes if the firm is publicly owned or a permanent
increase in profits if the firm is privately owned. Because of a cost
reduction, owners of the private firm can sell their stock today at a
higher price—a price which reflects the increase in both present and
future profits. But owners of the public firm receive only this
period's gain now and must remain in the same jurisdiction indefinitely
to receive their shares of future benefits. Since people move from
time to time, many will not receive their shares. This makes them less
interested in the operating efficiency of their public firm than the owners of the private firm. 13

In addition to those already mentioned, Buchanan and Devletoglou suggest that voters may be (nearly) indifferent about efficiency in public colleges for yet another reason: It may be the case that taxpayers provide funds to colleges not for the purpose of maximizing anything, but simply out of charity. Once charity has been extended, "the giver, whether he be private donor or public taxpayer, has little interest in the ultimate end product that his gift generates."14

Elected Representatives. To help explain the behavior of elected representatives, this section will begin by stating a generalized "theory of the firm" as applied to politicians.

Elected officials, according to the view taken here, are the suppliers of a single product: representation of voter sentiments within the legislative process. Like the producers of other goods, representatives compete among themselves and with opponents for the favor of customers (voters): these individuals expect that to the

13 This statement is applicable when the government firm is financed with taxes levied on anything other than immobile property that has an infinite "life." For a similar statement of this principle, see Earl Thompson, "Debt Instruments in Macroeconomic and Capital Theory," American Economic Review, Vol. 67, No. 5 (December, 1967), pp. 1196-1210.

degree they are successful they will be chosen to represent voters in future periods. It is their desire to be reelected, rather than altruism, that motivates representatives to act "in the public interest."\textsuperscript{15}

This view as man \textit{qua} supplier is essentially that of Adam Smith.\textsuperscript{16} Smith recognized that from time to time conditions prevent the competitive mechanism described here from working. In that event, producers have the opportunity to choose between helping themselves and helping others--and given the choice they will help themselves. The intensity of competition between suppliers, and therefore the extent to which customers are satisfied, is not so much dependent upon what suppliers "ought" to do as it is upon "market" conditions and the constraint they impose on suppliers who would prefer to act only in self interest.\textsuperscript{17}

The relevance of these comments for understanding political behavior is clear once it is recalled that politicians act in a market with two significant characteristics. First, customers (voters) have few personal incentives to either become informed about or choose

\begin{enumerate}
\item \textsuperscript{15}In many instances this phrase is ambiguous, but in the case considered here its meaning is clear. The public's interest is for government-owned firms to operate efficiently (i.e., produce the desired quantity and quality of output at least cost).
\item \textsuperscript{17}For a discussion of the competitive process, see Frederich A. Hayek, \textit{Individualism and Economic Order} (Chicago: Henry Regnery Co., 1948), chapter 5.
\end{enumerate}
between the products offered by different suppliers (politicians).\textsuperscript{18} Second, both custom and the law limit the personal rewards politicians receive from acting solely in the public interest.\textsuperscript{19} The latter condition means that for politicians to supplement their "incomes" they must act out of self interest rather than in the public interest, while the former means that the probability is low that a politician who legislates contrary to the public interest will be replaced by someone who will not. The result is that representatives have both the motive and the opportunity to advocate policies inconsistent with the desire of voters for efficiency in government firms.

From this conclusion it is possible to make a number of predictions about political behavior. For present purposes, however, the important predictions are those which relate to the behavior of representatives as they go about the task of overseeing the operation of public colleges. Unfortunately, prediction is possible only after assuming that certain specific variables enter into representatives' utility functions—assumptions which might ultimately prove to be incorrect. The variables selected here are prestige, time away from the job (leisure), and personal power. Their pursuit of these objectives, it will be shown, may cause legislators to display little regard for cost minimization by public colleges.

\textsuperscript{18} This is the point made by Anthony Downs, \textit{An Economic Theory of Democracy}.

\textsuperscript{19} In the public sector, merit pay, profit sharing, and stock options are not used to reward elected representatives regardless of their accomplishments.
The desire of representatives for personal power may be reflected in their willingness to support policies which improve their chances for reelection. This willingness is reflected in special interest legislation. Here, representatives formulate programs that provide significant and highly visible benefits to a small segment of society and finance those programs by imposing small and imperceptible charges on everyone else. The beneficiaries of such programs are expected to support legislators in future elections while others—who are "rationally ignorant" about what is happening—will decline to withdraw support because they do not fully realize the consequences of the legislation. This suggests that legislators who are in a position to force cost reductions in public colleges (e.g., by reducing funds for faculty salaries) may not choose to do so because it would cost them votes: the costs of such policies are concentrated on a relatively small number of voters who are cognizant of their effects while the benefits are negligible when spread over the remainder of the populace.  

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21 For example, suppose that a state has two million residents and its colleges have 2000 faculty members who are overpaid an average of $1000 each. Reducing salaries by this $1000 per faculty member would benefit the public by only one dollar each—hardly enough to affect the average individual's voting behavior—but would surely alienate the two thousand voters whose salaries were reduced.

22 The effect mentioned here will probably be less powerful during periods when public attention is focused on excesses in academe such as those which occurred in the late 1960s with the student anti-war demonstrations.
Next, consider what will happen if representatives value leisure. Cotton Lindsay\textsuperscript{23} has demonstrated that if a firm is directed to seek something other than profit (as public colleges are) and if those who oversee its operations are imperfectly informed (as leisure-seeking legislators will be), then a likely outcome is for productivity to be evaluated according to the values of a few easily measured ("visible") variables under the firm's control. That a college may exist to provide "good teaching" is of little importance, according to Lindsay's analysis, for good teaching is both difficult to define and difficult to measure. So representatives, when making appropriations, examine the achievement by colleges of a set of conspicuous and easily measured variables such as faculty publications and enrollments.\textsuperscript{24} Unless these variables are the same as or remain in proportion to colleges' true goals, the practice of "paying off" on visible achievements and neglecting less visible but more desirable ones will stimulate the production of the former and discourage the production of the latter. The result is for the cost of producing each unit of desired output to rise and for faculty salaries to exceed actual productivity to the degree that faculty behavior is affected by the perverse incentive structure.


\textsuperscript{24}Anecdotal evidence to support this hypothesis is abundant. Some colleges, for example, award faculty pay increases according to "points" earned from publications, years of experience, public speeches, teaching evaluations by students, and number of students taught. This topic is discussed by Susan Loving, "Salary Lists: Less Joy in Academia," \textit{Blacksburg Sun}, August 20, 1978, pp. A1-2.
Finally, suppose legislators seek prestige or favorable recognition while in office. Elected representatives are easily among every community's more recognizable citizens and are also the providers of funds for public higher education—positions which cause their own prestige to be linked to that of colleges within their state. Both politically and legally constrained from directly spending public funds for personal gain, legislators can indirectly do so by channeling resources to uses they personally prefer, including athletic entertainment (e.g., football) and "high quality" (i.e., prestigious) education. More will be said about the impact the desire for prestige has on faculty salaries later in this chapter.

In conclusion, elected representatives have considerable latitude when making public policy and will, under a set of quite plausible conditions, allow or promote cost-increasing activities in public colleges. Included is the possibility that faculty salaries may exceed those dictated purely by productivity considerations. Perhaps more importantly, politicians whose constituents are relatively uninformed are unable to appropriate a significant share of the benefits their intervention in public firms could generate. Since the costs of intervention are not negligible, legislators will be uninterested in participating (or in providing incentives for others to participate)

in efforts to control the costs of public colleges. It is the behavior of governing boards (elected officials' agents in colleges) to which the discussion now turns.

**Governing Boards.** It was noted in Chapter 2 that members of college governing boards seldom receive monetary compensation and serve either because they believe it is their civic duty to do so or because of the prestige which accompanies the position. Each of these observations is a comment on the incentive that individual board members have to fulfill their formal obligations, so each is important for understanding the behavior of governing boards.

That trustees serve without pay severely limits their ability to capture a share of whatever social benefits would be generated by their increased attention to college governance. Insofar as the desire for personal gain motivates human action, the effect of this constraint is to stimulate trustee inaction rather than its opposite. Moreover, since trustees commonly occupy important positions in the business sector and

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27 Inefficiency in government firms has been widely discussed. See, for example, a study of the U.S. Postal Service by Douglas K. Adie, An Evaluation of Postal Service Wage Rates (Washington, D.C.: American Enterprise Institute, 1978). According to Adie, postal employees are overpaid by approximately one-third.
probably value their time highly, it is surprising if they (in their role as trustees) do anything at all!

The possibility exists, of course, that some trustees are willing to pay the cost of performing their jobs well because of their desire to serve the public. To the extent that such individuals know what the public wants, are able to monitor activities within colleges, and are free to impose rewards and punishments on employees, the "civic duty" argument is valid, but it will not operate effectively unless a majority of trustees behave similarly. Experience suggests that trustees are seldom as concerned with the public interest as with their own, however. One observer has written that "while many leaders in the community like the prestige attached to the trusteeship, they shy away from the notion that some time and effort is involved." 28

Thus, it appears that the desire for prestige causes many individuals to become trustees, and this desire probably plays an equally important role in motivating their behavior after accepting the job. If that is so, then it follows that trustees will try to channel funds away from activities within their college which add little to its (and their) prestige, and toward activities which contribute more to it. It is well known that a college's prestige is closely related to the

quantity and quality of publications written by its faculty, and it is equally well known that, ceteris paribus, colleges which offer the highest salaries are more successful in attracting publishing professors than colleges that make lower offers. Therefore, the tendency is for prestige-seeking trustees to use what influence they have to raise faculty salaries rather than lower them—irrespective to the public interest.

While supporting data on salaries will be presented in Chapter 5, a report issued by the Carnegie Commission on Higher Education notes that prestige-seeking affects other aspects of academic policy also:

The sizes of graduate programs are currently excessively large because of a desire for institutional prestige.

A recent survey by Mahew indicated that some 130 to 150 institutions that do not have doctoral programs had plans to develop such programs. (page 156)

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Since it is already true that a large percentage of graduating doctoral students are unable to find jobs, and since governing boards must grant their permission before new graduate programs can be initiated, these observations support the hypothesis that trustees make policy to enhance their own prestige; at the very least, they reduce the creditability of the civic duty argument discussed above.

In view of the conclusion reached in Chapter 2—namely, that trustees today exercise only nominal control over colleges—the effects mentioned here are probably quite small. That is not to say that trustees have no impact on policy, however, since trustees select the college president and he makes policy for many years. Leisure- and prestige-seeking trustees, then, can be expected to select a president whose goals coincide with their own and grant him considerable power and discretion. In this way their own goals can be pursued at minimum personal cost.

Administrators. This discussion will concentrate on the behavior of two administrators only: the college president and department heads. The president is responsible for obtaining funds to finance his institution's operations and for setting overall policy for the college; a department head represents his department's needs within the

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32"The board . . . relies heavily on the president's approval, . . . follows his suggestions . . . agrees on what shall be done first and what last and what not at all, largely according to his judgement or preferences." Gerald P. Burns, Trustees in Higher Education, p. 82.
administration and is responsible for a number of things including obtaining funds to finance his department's operations.

The College President

College presidents, like trustees, are seldom compensated according to their ability to reduce production costs. This income constraint limits the willingness of presidents to engage in efficiency-oriented activities, and that implies higher operating costs than are necessary to produce a given quantity and quality of education. To be more specific about the areas in which inefficiencies will occur, it is necessary to understand the structure of incentives that college presidents face.

For some insight into that structure, it is helpful to ask this question: If presidents are not rewarded for reducing their colleges' operating costs, for what activities are they rewarded? Alchian suggests that a manager is compensated according to what prospective employers expect him to produce in the future, and that expectation is based in part on the manager's past performance. This has important implications when college presidents seek higher incomes and the members of governing boards desire prestige and leisure. The first condition means that a college president has an incentive to implement those policies that he believes will promote the outcomes desired by

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future prospective employers; the second, that when governing boards hire a president they will tend to concentrate on easily obtained information and place relatively more weight on information relating to a candidate's prestige-producing capabilities. Fortunately for trustees, the most easily obtained information about a prospective president usually pertains to his success in producing prestige in earlier jobs. Aside from the "quality" of the college at which a candidate has previously worked, easily gathered information includes that on well-publicized problems or achievements, enrollment changes, and ability to attract outside funds. Information on efficiency gains is relatively more costly to evaluate because of difficulties encountered when attempting to measure educational output and because of an unknown number of "mitigating circumstances," the effects of which are difficult to quantify.

From these comments spring a number of predictions about the behavior of college presidents—predictions about what can be expected in the area of faculty compensation. If governing boards are believed to reward prestige, presidents will favor high faculty salaries because they attract publishing professors to their institutions. A president's desire to avoid adverse publicity can also push faculty salaries upward. A president may decide to pay his faculty a little more than its true worth in order to promote harmony within his institution—and thereby increase his chances of being hired by
trustees at colleges who value his ability to "effectively" deal with the faculty. 34

Finally, a number of other factors also put upward pressure on faculty compensation, although their effects are perhaps of a smaller magnitude than those already mentioned. These points are straightforward and require little explanation.

1. Many administrators are former college instructors and may be sympathetic with faculty "needs"—and may even plan on returning to teaching in the future.

2. "Academic freedom" and tenure prevent administrators from

34 That presidents may try to "buy" harmony by paying too-high faculty salaries has been suggested by many, including Harry Johnson, On Economics and Society, pp. 170-171; Roger W. Heynes, "The Nature of the Academic Community," in Calvin B. Lee, Improving College Teaching (Washington, D.C.: American Council on Education, 1967), pp. 47-48; and Allan M. Cartter, "The Economics of Higher Education," in Neil W. Chamberlain, Contemporary Economic Issues (Homewood, Ill.: Irwin, 1969), pp. 145-184. A quote from Cartter—an economist and then chancellor, later president, of New York University—is enlightening: "Deans, provosts, even presidents, more frequently are judged successful or not by their ability to keep a majority of their student, faculty, alumni, and trustee constituencies behind them in the whole array of administrative decisions they must make. Such support is seldom based on matters of economic efficiency" (p. 184, italics added).

effectively monitoring certain aspects of faculty output or from firing incompetent faculty members.  

3. A large fraction of faculty income is nonpecuniary, so outsiders may be unaware of whether faculty salaries are excessive or not; this reduces the political pressure on college presidents to lower salaries.  

4. In many firms, salaries paid to executives are related to those earned by other employees. When that is the case, a rise in employee (faculty) compensation is accompanied by an increase in executives' (administrators') pay as well. 

5. Administrators may be willing to pay their faculty in excess of the market wage in order to keep them from unionizing. The objective is not to prevent salaries from rising—for if it is, administrators will have defeated their purpose by granting the increase necessary to preclude unionization—but to keep the faculty from organizing into a group that could reduce administrators' control over other aspects of policy (e.g., capital expenditures). 

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35 For a thorough discussion of tenure, refer to Alchian's Economic Forces at Work, chapter 7. Empirical studies support the proposition that faculty productivity falls once tenure has been granted, as noted by John W. Holley, "Tenure and Research Productivity," Research in Higher Education, Vol. 6, No. 2 (1976), pp. 181-192.  

36 A similar point has been made in regard to the wages of municipal government employees by Bernard F. Lentz, Public Sector Wage Determination: A Democratic Theory of Economics (New Haven, Conn.: Unpublished Ph.D. dissertation, Yale University, 1976), pp. 10-11.  

37 This point was suggested to the author by Gordon Tullock.
These effects all operate in the same direction\textsuperscript{38} and will, _ceteris paribus_, cause faculty salaries to exceed what productivity considerations alone would indicate. However, it is also true that other factors may offset these distortions. Oliver Williamson\textsuperscript{39} suggests that managers have preferences for expenses which provide them with utility. A college president might want, for example, a larger office for himself and his staff, more elevators in the administration building, or a better football team. Since a president's ability to incur such expenses with an operating budget of some fixed amount is reduced when faculty salaries rise, he has an incentive to monitor faculty pay and reduce it whenever possible. The strength of this argument is diminished by a few pertinent observations: First, while it is true that the president has an incentive to reduce salaries when the operating budget is of a fixed size, it is also true that he may be able to secure funding for "preferred" projects from supporters sympathetic to his goals—perhaps alumni. Second, at least some of a president's expense preferences relate to the construction of new buildings on campus. Since funds for construction projects are normally drawn from the capital budget while faculty salaries are included in the operating budget, there may be no conflict between expense preferences

\textsuperscript{38}However, it is not claimed that the effects are additive. A salary policy which satisfies one "requirement"may be sufficient to satisfy them all.

and faculty salaries. Last, the president's ability to spend funds for his own benefit is constrained by the presence of informed faculty members who are aware of the inverse relationship between their pay and "other expenses."

All things considered, college presidents have almost no personal incentive to hold down operating costs of the colleges they manage—indeed, they are often motivated by self interest to pay their faculty in excess of the market-clearing wage. This tendency is offset by the monitoring activities of legislators and by presidents' expense preferences, but both constraints operate imperfectly because of voter ignorance, utility-maximizing behavior by legislators, and institutional limits on presidents' ability to appropriate budgeted funds for their own benefit.

Department Heads

If it is true that college presidents are both willing and able to overpay their faculty, the next question concerns how the excess is to be distributed. Which departments can be expected to be most successful at claiming shares in this fund? Answering this is not easily accomplished, for behind the question lie a number of unknowns which vary from one college to the next. Abstracting from these differences, however, it is possible to arrive at a few predictions which will be tested in a later chapter.

Focusing on the incentive structure that department heads confront is both interesting and instructive, but does not explain how excess
salaries are divided among the faculty. To see why this is, suppose faculty pay in department A rises while pay in all other departments (and at all other colleges) remains unchanged. Department A's ability to hire publishing professors has now increased, benefiting the department head both directly and indirectly. The direct benefits derived from being associated with a department whose national (or regional) reputation has grown, which in turn implies an added measure of independence from administrative control for Department A within its college. The head's salary probably also rises because he is both a faculty member (and pay is rising for members of his department) and the supervisor of a more "productive" and highly paid group of workers than before. The head benefits indirectly as members of his department become more supportive of his leadership following their salary increase. Because of these benefits, it is difficult to imagine a department head who will not lobby with higher administrators for an increased wage fund for his faculty. But since all department heads face the same incentives and will respond similarly, there is at this point no reason to predict that any one department's salaries will be "more excessive" than those of other departments.

Faculty. A second answer is more subjective, and begins by assuming that faculty salaries in various disciplines are the outcome

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40 David Breneman comments on the added independence a department receives as it becomes more prestigious in his monograph, Graduate School Adjustments to the "New Depression" in Higher Education (Washington, D.C.: National Board on Graduate Education, 1975), p. 4.
of a bargaining process (which may be either implicit or explicit) between the faculty as a whole and administrators. In this setting, faculty salaries—and not "excess faculty salaries," for individuals are seldom so candid as to admit that they are compensated in excess of their worth—are determined according to criteria considered appropriate by participants in the bargaining process. Predicting salaries is contingent upon identifying what those criteria are likely to be.

Faculty members can influence salaries without being members of an official salary committee—e.g., by revolting against uncooperative administrators or by threatening to leave the college if the salary policy does not represent "legitimate" faculty interests.

This assumption may be incorrect. Unless faculty pay is determined by supply and demand conditions, all that is known with certainty is that some alternative rule must be chosen. What that rule will be is not certain, for colleges differ in many respects—some of which may be important for choosing the pay-setting rule. In colleges where administrators dominate the faculty, preferential treatment may be given those departments from which administrators were promoted; since these departments are typically in the social sciences, humanities, or education (the background of college presidents is discussed by Harold L. Hodgkinson, Institutions in Transition (New York: McGraw Hill, 1971), chapter 8), one might postulate that salaries will be more excessive in those departments than in others. The bargaining model is chosen here, however, because experience suggests that administrators who do not satisfy most of their faculty constituents are unable to manage effectively over the longer run. Actual experience suggests that faculty members participate in academic governance indirectly: they are represented by bodies such as the American Association of University Professors (AAUP) and the faculty senate. It recommends that salary policies be "designed by a representative group of the faculty in concert with the administration." See "The Role of Faculty in Budgetary and Salary Matters," AAUP Bulletin, Vol. 62, No. 4 (Winter, 1976), p. 380.

At this point, the analysis has shifted to a different level. No longer is the question who gets paid too much, but instead, who gets paid how much. The importance of this distinction will become clear below.
One possibility is that salaries will be set according to the non-academic market's evaluation of each faculty member's anticipated production during the contract period. This possibility is ruled out on two counts. First, if funds are available to compensate the faculty in excess of what nonacademic employers pay (as predicted), individual faculty members will not voluntarily settle for a lesser amount. Second, the very existence of government subsidies to higher education is indirect evidence that the public and its representatives believe that the private market does not reward teaching and research activities commensurate to their true social value. Administrators and faculty must either accept this idea or be prepared to refuse future subsidies. The first possibility is probably more likely.

If nonacademic wages cannot serve as a benchmark for setting faculty salaries, then some other method must be selected. Reaching agreement under these circumstances will be difficult, however, because whatever rule is finally adopted will either explicitly or implicitly

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44 Although it has already been demonstrated that colleges should normally be able to obtain a wage fund which exceeds the faculty's market value, it has not been shown that individuals within colleges will reject market criteria as an acceptable means of setting pay.

place relative values on knowledge in the various disciplines. When
the value of knowledge cannot be measured against any objective stan-
dard, a rule which provides for the members of some departments to be
compensated more than the members of other departments will be viewed
as arbitrary. Moreover, if the rule is to remain in effect for
several years, faculty members will be uncertain of their future in-
comes and will, therefore, hesitate to support a rule that allows
radical changes to occur in relative salaries over the longer run.
These two problems imply that agreement can be reached only if the
salary policy minimizes pay differences between departments except when
obvious problems arise and differentials become necessary.

46 In 1973, a Dartmouth compensation committee, composed of pro-
fessors from economics, French, mathematics, sociology, and other dis-
ciplines, stated, "Since institutions constitute essential communities
of scholars, there is a general feeling of what may be termed academic
equity—that difference of compensation among faculty members of equal
experience and standing within their own special fields should be as
small as is consistent with maintenance of high quality faculty in each
department." (Quoted by Richard B. Freeman, "Demand for Labor in a
Nonprofit Market: University Faculty," p. 103.)

47 Buchanan and Tullock argue that when individuals are uncertain
about their future incomes it is rational for them to favor rules which
reduce income fluctuations over the longer run. See their discussion of
"income insurance" in The Calculus of Consent (Ann Arbor, Michigan: The

48 Kershaw and McKean make the point that a salary policy which does
not discriminate by discipline will raise the total wage bill required
to hire the desired quality of faculty by preventing the employer from
acting as a discriminating monopsonist. Joseph Kershaw and Roland
McKean, Teacher Shortages and Salary Schedules (New York: McGraw Hill,
Three such problems may occur. First, knowledge in some fields may be recognized as having greater value than that in others. There is considerable risk to any department which makes this claim, however, because of the precedent it sets for the future. A physical science department during the "space race" of the late 1950s through about 1970 is a case in point. Had such a department claimed additional pay during that period on the grounds that certain knowledge was of special importance to the nation's space program, those in other disciplines would have been justified in demanding a drastic salary cut in the physical science department when the race ended in the 1970s. Even if this risk is ignored, difficulties in measuring and comparing the value of knowledge in various disciplines makes it doubtful that claims of special merit for most departments could be substantiated; the tendency is to avoid making such claims in order to prevent antagonisms from arising. For the most part, then, one should expect members of the academic community to view themselves as a company of equals engaged in producing varied outputs of approximately equal value. 49,50

49 There is a strong support for this conclusion. The AAUP issued a statement that contains the phrase, "The permanent members of a university are essentially equals." AAUP Bulletin, Vol. 42, No. 1 (Spring, 1956), p. 42; Talcott Parsons, the sociologist, has written that "the basic structure of the faculty tends to be that of a 'company of equals.'" Talcott Parsons, "The Academic System: A Sociologist's View," Public Interest, No. 13 (Fall, 1968); Richard B. Freeman, when discussing academe, has said that "in essence, universities affirm an intellectual value structure that presupposes little or no inherent superiority to knowledge in various fields." Richard B. Freeman, "Demand for Labor in a Nonprofit Market: University Faculty," p. 104.

50 One writer, a dean at a large public college, suggests that administrators may also prefer a salary policy that does not discriminate
Second, those in the bargaining process might agree to a salary policy which allows some faculty members to earn more than others when there are corresponding differences in the cost of qualifying for jobs. Casual observation suggest that individuals from all walks of life are less likely to oppose "high" prices when they can be justified by "high" production costs, and the same line of reasoning may apply to salaries as well. This may help explain, for example, why faculty members with masters degrees are paid less than those having Ph.D.s even when both perform essentially the same duties. With only a few notable exceptions (e.g., in the field of art where the terminal degree is the Master of Fine Arts, and in medicine where the terminal degree is the M.D.), professors in all departments attend graduate school for approximately the same number of years and hold the same academic degree. To the extent that production costs influence salaries, therefore, academic salaries will tend toward equality across disciplines.

between disciplines. He writes that, "... In salary negotiations with other deans or departmental chairmen, I have been told that they regard all of their faculty as equally meritorious and hence entitled to identical salary increases... I suspect this is because administratively it is easier not to discriminate." Philip Cartwright, "The Economics of Deaning: The Care and Feeding of Homo Academicus," Western Economic Journal, Vol. 3, No. 2 (Spring, 1965), p. 163.

The desire of administrators not to have to discriminate between disciplines seems to conflict with their desire to maximize the prestige of their college, for only by paying the most productive faculty members more than others is it possible to retain them. This apparent conflict disappears with the introduction of "merit pay." With a merit pay plan, it is possible for some members of the faculty to earn more than others while most administrators are spared the burden of having to decide who this should be; with merit pay, the task of awarding differential pay increases can be shifted onto the department head.
Finally, although colleges do not pay their faculty at the private market wage rate, conditions in the private market may nevertheless influence faculty pay under certain conditions. In the event that the members of some department are paid less than they could earn in non-academic jobs, negative academic rents appear, the more productive faculty will leave the college, and the prestige of the college will fall.\footnote{At present, there is concern within the University of California system that because faculty salaries lag behind salaries paid by colleges elsewhere, the system may lose many valuable professors. See Beverly T. Watkins, "Scaling Down the Multiversity," \textit{Chronicle of Higher Education}, Vol. 18, No. 11 (May 7, 1979), pp. 3-4.} To prevent that from happening, it is necessary for discounted lifetime incomes in each department to be at least equal to those earned in the corresponding field of the nonacademic sector, less the full costs of changing jobs. This policy will be acceptable to faculty from all departments who are concerned with whether their incomes will be allowed to keep up with those earned outside of academe or who care about the overall quality of their college. This awareness of market conditions is almost certainly one of the factors which cause salaries in business departments to be higher than those in other departments.\footnote{To this point in the discussion, no distinction has been made between new and existing faculty at a college; both were predicted to be overpaid relative to salaries in the nonacademic labor market. A reasonable question to ask is why existing administrators and faculty do not agree to discriminate against newly hired personnel by paying them only at the market wage rate and to distribute the proceeds from discrimination to existing employees. There are three reasons they do not do that. First, unless most colleges follow that policy, the few which try to implement it will be unable to hire qualified new faculty. Second, such discrimination violates one of the ideas incorporated in the salary policy already discussed: that all members of the faculty produce an output of essentially equal value. Widespread violations of that rule would introduce another kind of rent. Finally, the most productive faculty will leave if they are not paid competitively.}
Summary. To summarize the discussion to this point, it is helpful to recall that individuals in public colleges have almost no personal incentive to reduce the cost of producing a given quantity and quality of education. Because of this, academicians have considerable discretion in establishing what they consider to be a reasonable salary policy. Both administrators and faculty were predicted to favor a policy which tends to equalize pay across disciplines: The former, because of difficulties encountered when discriminating against some disciplines and in favor of others; the latter, because that policy both increases the total wage bill at their college and provides them with "income insurance" to reduce fluctuations in their pay over the longer run.

Efficiency in Nonprofit Firms

Paradoxically, a nonprofit firm is not defined as an organization which earns zero profits, but instead as a firm which has no owners. Technically, of course, this cannot be correct since all firms must be owned by someone—and nonprofit colleges are legally owned by their boards of trustees. But a firm's owners are generally understood to hold title to its assets, stand responsible for its liabilities, and receive whatever profits it earns. It is in this sense that nonprofit
firms have no owners. A college trustee does not personally own any part of his institution, is not personally responsible for its liabilities, and is prohibited by law from claiming its profits as his own.

These ownership arrangements are important in a discussion of non-profit colleges. The previous two sections made the point that efficiency within firms is dependent upon owners' efforts to promote cost-minimizing production techniques. When the cost to owners of stimulating efficiency is high and the reward low, owners will avoid such tasks and their firms will operate inefficiently. Nonprofit colleges provide still another application of that principle. Since owners (trustees) personally receive no additional income if their college becomes more efficient, their incentive to work toward that end is small. The prediction here is unambiguous: Other things being the same, nonprofit firms will have higher production costs than profit-seeking firms. It is likely, therefore, that nonprofit colleges will also pay their faculties at rates which exceed those established in the private market.

If both public and private nonprofit colleges are expected to compensate professors in excess of their market value, it is important to ask which will pay more and which less. Although other factors may influence the relative level of wages paid by the two types of colleges, the present discussion is concerned with the role played by institutional arrangements. This section explains how differing arrangements cause private colleges to pay lower salaries than public colleges.
Owners and Efficiency. Taxpayers benefit from cost reductions in government firms by having their tax bills reduced. The possibility of tax reductions, then, is the incentive to owners to become informed about and involved in policy making in public colleges. This involvement will be negligible for at least two reasons. First, there are a large number of owners who must share in the proceeds of cost reductions, so each will receive only a very small gain from increased efficiency. Second, the institutional design of public colleges is such that it is costly for owners to control the behavior of college officials; a large number of intermediaries (elected representatives, college trustees) stand between owners and their colleges, so the relationship between them is indirect and usually imprecise. The net result is for taxpayers to largely ignore their role as owners except when unusual circumstances arise and the reward for involvement becomes greater.

As mentioned above, the owners of nonprofit organizations are legally barred from claiming the rewards from increased efficiency in the firms they own. This implies that the trustees of nonprofit colleges have no incentive to institute policies designed to reduce operating costs (including faculty salaries). While this would seem to indicate that private colleges will operate even less efficiently than public colleges, two further considerations may change this conclusion. First, inefficiency implies a reduction in the size of a private college's endowment. In a sense, this is analogous to the tax increase caused by inefficiency in a public college. However, there is an important difference between the two cases. The trustees of a non-
profit college are aware that any reduction in their institution's endowment will diminish its ability to provide education in subsequent years. By contrast, a tax increase this year does not imply a similar consequence in later years for the public college. If trustees are concerned with the production of education, the tendency is for trustees of the private college to try to preserve (or enlarge) the endowment—and this, not unlike profit-seeking, will reduce the amount of waste in private colleges below what would otherwise be allowed to occur. Second, although they are stopped from receiving profits, many trustees still have a personal interest in protecting the endowment. By virtue of their position, trustees may be able to influence the way endowment funds are invested so as to further their own ends; the larger the endowment, the greater the personal gain from investment activities. Trustees in a position to affect the placement of funds, then, have an incentive to promote efficiency since it causes both the endowment and their incomes to rise. The bulk of endowments are owned by private colleges, so it follows that if trustees behave as described here.

53 In 1978, for example, 21 of the 25 colleges with the largest endowments were private and only four were public. Data on endowments can be found in "Market Value of Endowment Funds at 144 Colleges and Universities," Chronicle of Higher Education, Vol. 18, No. 9 (April 23, 1979), p. 15.

54 The following quote indicates that trustees behave as described here: "A report issued in 1977 by the 20th Century Fund...states in reference to educational endowments that 'boards of trustees that rigorously maintain arm's-length relationships and pursue the best interests of the endowment fund above all' tend to be the exception...(A) number of foundations hold the majority of their assets in shares of their major donors' firms and use the services of banks controlled by foundation trustees." Lawrence Maloney, "Big Profits in 'Non-Profits,'" Reader's Digest, Vol. 114, No. 684 (April, 1979), p. 172.
then one should expect private colleges to be more efficient than public colleges.55

**Multiplicity of Goals and Efficiency.** In Chapter 2, it was noted that during a period which began in the late 1800s two things happened to significantly change the nature of academe. The first of these was a rapid growth in the sources of financial support for colleges. The first and second Morrill Acts, the tax advantage given to individuals who donated to colleges, and the growth of research and development activities all expanded colleges' receipts and made them less dependent on any single source of revenues for their continued existence. This, in turn, brought colleges some measure of independence from outside control.

Closely related to this was the second major change. As colleges developed relationships with a growing number of outside supporters, they were both called upon and financially able to pursue a set of goals which had previously been outside the scope of American higher education. (It was at this point that the author of the land-grant bills was quoted as saying that colleges should teach "all the learning demanded by any

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55 This conclusion is implicitly based on a comparison of the personal loss to the trustees of public colleges from the tax increase implied by inefficiency and the personal loss to the trustees of private colleges from their share of interest income lost (from the endowment which was lost) due to inefficiency. The former sum is believed to be nearly equal to zero, and will, therefore, probably be less than the latter.
proportion of the . . . people."56) As they did so, it became increasingly difficult for outsiders to monitor the quantity and quality of education being produced, so colleges were relatively free to make policy independent of outside pressures. In tandem, these changes made it possible for colleges to do what this chapter has predicted: pay their faculties at rates that exceed market-clearing levels.

These points are useful when trying to establish an expected relationship among salaries at various types of colleges. If colleges tend to pay higher salaries as they become more complex (where complexity is defined in terms of multiple goals and funding agents), then one would expect public colleges to compensate their faculty above what private colleges pay. Similarly, nonprofit church-related colleges, which tend to pursue a relatively small number of goals and receive funding from only a few sources, will probably pay less than nonprofit independent colleges.

Summary. Because owners of nonprofit firms cannot legally appropriate any share of whatever reductions in operating costs they bring about, it is normally not in their personal interest to become involved in the difficult process of increasing efficiency in private nonprofit colleges. While inefficiency—including overpaying faculty—will

therefore be widespread in these institutions, there is theoretical support for the propositions that church-related colleges will be more efficient than private-independent colleges, and that both will be more efficient than public colleges.

Prestige and Faculty Salaries

A considerable part of the discussion of public colleges revolved around the subject of prestige; elected representatives, governing boards, college administrators, and faculty members were all said to seek prestige. While the section on private colleges was silent on the issue, that was only because a second discussion of the same point was unnecessary: Individuals associated with private colleges were assumed to be no different than those in public colleges. Dropping the distinction between types of colleges, then, this section examines what impact the desire of college officials for prestige can be expected to have on faculty pay.

For the most part, colleges are recognized as centers of knowledge and learning to the extent their faculties write articles and books of a scholarly nature. Thus the relationship between publications and prestige is a close one. Recognizing that fact, administrators and other decision makers who desire prestige for their institution attempt to hire professors with the ability to publish. This stimulates the

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57"This set of statistics lends support for the idea that there is a monolithic status system in American higher education, and that its base is in research and in the 'national reputation'. . . that research . . . apparently can bring." Harold L. Hodgkinson, *Institutions in Transition*, p. 17.
demand for publishing professors beyond the demand for their other
services, and salaries rise accordingly. The implication is that
faculty salaries at prestige-oriented colleges can be expected to
exceed those at other colleges, a proposition that will be investigated
in more detail in Chapter 5.

The overall desirability of the emphasis on research by faculty
is uncertain. It is clearly socially undesirable for colleges to devote
resources to the production of prestige for the personal benefit of
college officials if all other efficiency criteria are met. However,
when individuals cannot appropriate the full benefits of knowledge
which they create, insufficient resources will be devoted to research
activities. If the overinvestment in research resulting from prestige-
seeking is less than or equal to the underinvestment caused by non-
appropriability, the former distortion tends to offset the latter and
the outcome is socially desirable (although the process by which that
outcome is arrived at may be undesirable).

Efficiency in a Dynamic Setting

To this point in the discussion, the behavior of firms has been
examined under the implicit assumption that conditions in the doctorate
labor market are unchanging. Assumptions of this nature are important,
for they allow analysts to focus on the underlying relationship between
one variable and another. By assuming that nothing except ownership
arrangements and individual behavior are variable, this chapter demon-
strates that the attenuation of property rights can reasonably be
expected to reduce the interest of decision makers in the quality of their decisions. Applying that principle to the operation of colleges suggests that faculty will be compensated in excess of market-clearing wages.

Suppose, however, that the supply or demand for doctorate manpower changes. What will happen then? Although the discussion above assumed stable market conditions, there is no reason to believe that decision makers will be any more (or less) conscious of efficiency issues in a dynamic setting than in a static one. What this implies is that salaries in academe will respond more slowly to shifts in supply and demand than salaries in the nonacademic sector. This does not mean that nonacademic salaries will adjust instantaneously or that faculty salaries will not adjust at all—but that the former will adjust more rapidly than the latter. The result will be prolonged periods of shortage and surplus, and corresponding movements of manpower between employment sectors. A discussion of the doctorate labor market and how it has adjusted to changing supply and demand conditions over the past two decades can be found in Richard Freeman's latest book, The Overeducated American.58

Chapter 4
THE THEORY OF RENT-SEEKING UNEMPLOYMENT

Introduction

The previous chapter examined the consequence of a situation where college employees (faculty and administrators) make most policy decisions but are not rewarded for doing so efficiently. From that discussion came a number of predictions about the operating efficiency of colleges. Of particular interest here are two predictions which relate to faculty salaries:

1. salaries (pecuniary plus nonpecuniary) in nonprofit private and government colleges will exceed those paid by for-profit nonacademic firms, and

2. faculty salaries will tend towards equality across disciplines

If it should turn out that these predictions are correct and the findings of Chapter 5 suggest that they are, the market for doctorate manpower is segmented between more desirable and less desirable jobs. Neoclassical economists have usually ignored markets of this type; they assume wage flexibility (except in the event labor unions or the government interfere in the market process), and in doing so limit their analysis to markets.

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1 In the discussion which follows, the terms "salary," "wage," and "income" are used interchangeably and are meant to include both pecuniary and nonpecuniary rewards to employment (except where noted).
in which all jobs are equally desirable and unemployment never exists. By contrast, what is proposed here is that the market for doctorate manpower has been "distorted" by the compensation policies of academic employers. Chapter 4 analyzes the effects of this particular distortion—segmentation of the market—on Ph.D. unemployment.

At an earlier point in this dissertation, the accepted explanations for the doctorate surplus were criticized for not answering two questions: Why has unemployment persisted for as long as it has? Why is unemployment so much worse in some disciplines than in others? The present chapter attempts to answer these questions.

The Duration of Ph.D. Unemployment

This section accepts as correct the prediction that colleges pay their faculties somewhat more than the equilibrium wage rate, and seeks to determine what consequence that policy will have on Ph.D. unemployment. The problem is simplified somewhat by the fact that labor economists have analyzed a situation that is similar to the present one: a minimum wage in the market for unskilled labor. It is appropriate to begin the discussion by reviewing that analysis.

Refer to Figure 3. Along the horizontal axis are homogeneous units of labor services and along the vertical axis is the real wage rate. The $S_L$ curve is the labor supply curve; its positive slope indicates that as the real wage rises more units of labor services will be offered for sale during any given time period. The $D_L$ curve is the labor demand curve; its negative slope indicates that as the real wage rises employers reduce the quantity of labor services they are willing to hire in each
Graphical Representation of a Segmented Market for Doctorate Manpower
period. In the absence of market distortions, the real wage will settle at $w_e$—the market-clearing wage. At $w_e$, the quantity of labor services offered for sale is just equal to the quantity of labor services demanded by employers; neither a shortage nor a surplus of labor services exists.

Suppose now that something—e.g., a minimum wage law—puts the real wage at $w_1$ and prevents it from falling below that level. The higher real wage signals both groups of market participants to change their behavior: workers increase the quantity of labor services they offer for sale, and employers decrease the quantity of labor services they are willing to hire. In tandem, these two actions result in a surplus of labor services (i.e., unemployment) of an amount equal to $L_1 - L_0$ units. This conclusion applies generally, and not only to the market for unskilled labor. If, for example, something causes the real wage paid to all Ph.D.s in some discipline to exceed the equilibrium real wage, at least some individuals will be unemployed.

While this analysis is correct under "normal" circumstances, it must be modified somewhat since conditions in the doctorate labor market are more complicated than those usually considered: The market for Ph.D.s is segmented between two employer groups, one of which pays a higher real wage than the other. In a competitive labor market this form of segmentation cannot persist; labor will move from less-preferred to more-preferred jobs, driving wages up in the former and down in the latter until all jobs are equally desirable. For reasons discussed above, however, some firms (e.g., colleges) may not lower wage offers when a
surplus of applicants appears—so the doctorate labor market may continue to be segmented even if labor is mobile.

If firms in the nonacademic sector pay employees the market-clearing wage while those in the academic sector pay their employees more, then individuals employed by colleges receive economic rent. Economic rent is said to exist whenever the owners of some good are paid more than the amount necessary to induce them to offer it for sale. Rent, then, is an incentive—a signal—for new suppliers to enter a market in hopes of capturing a share of the positive net benefits received by existing suppliers. The same is true for labor markets. When college faculty receive rents, Ph.D.s employed outside academe have an incentive to seek faculty positions.

Seeking faculty positions, however, is not the same thing as finding them. If faculty salaries are inflexible downward, then the total number of jobs in the academic sector is fixed.² If all existing faculty retain their jobs, this means that applicants will be unable to move into academic employment. Paradoxically, this implies that no Ph.D.s will be unemployed: When there is no chance of finding an academic job, new Ph.D.s will accept positions in the nonacademic sector and individuals already in the nonacademic sector will stay there; as long as the non-academic wage remains flexible, all will find employment.

What is more likely is that vacancies in the academic sector will appear each year as existing faculty die, retire, quit, and are discharged.

²This follows from the law of demand.
In that event, Ph.D.s not employed in academe must choose between accepting a nonacademic job and trying to find an academic job. Unless it is known in advance who will be successful at finding faculty positions, the number of applicants will exceed the number of vacancies: If not all vacancies are filled, more applicants will appear; if the number of applicants is equal to the number of vacancies, more applicants will appear who believe themselves to be more highly qualified, better informed, or more fortunate than existing applicants. But if the number of applicants for academic positions exceeds the number of positions available, at least some Ph.D.s will be frustrated in their job search. A nonacademic career, then, offers certainty of employment and low wages while an academic career offers higher wages but less certainty.

Because employment in academe is difficult to find, applicants often invest resources in qualifying for and searching out jobs. These activities are referred to as rent seeking, since those who undertake them expect to receive rents in the event that they are successful. Rent-seeking activities are rational from the individual's standpoint as long as the cost of engaging in them is less than or equal to the gain they can be expected to produce. Although rent seeking may consist of many different activities, a few are common among Ph.D.s trying to

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Rent-seeking activities are actions undertaken for the purpose of increasing one's chances of receiving economic rents. For a discussion of these concepts, see Gordon Tullock, "Efficient Rent Seeking" (Blacksburg, Virginia: Center for Study of Public Choice Working Paper No. CE 78-2-6). For an interesting example of rent-seeking in academe in the Soviet Union, see Michael Binyon, "Soviets Question Value of Entrance Exams," Chronicle of Higher Education, Vol. 18, No. 18 (July 9, 1979), p. 5.
find academic employment. For example, an individual might undertake a year of postdoctoral study in hopes of receiving job offers ahead of qualified applicants who have not done postdoctoral work. (Postdoctoral study is seldom necessary for teaching undergraduate courses.) Other examples include devoting extensive time to arranging and attending job interviews, working only part-time and spending other time doing research, and refusing to accept nonacademic employment that would reduce one's chances for an academic job in future years. In each instance, the individual is sacrificing current wealth in order to increase his ability to obtain an academic (or rent-paying) job, so these activities qualify as rent-seeking. What is important about these examples is that they illustrate how the existence of a differential between academic and nonacademic wages can cause individuals to remain either unemployed or underemployed rather than accept employment in the nonacademic (low-wage) sector.

These ideals are expressed graphically in Figure 4. There, the number of Ph.D.s in a discipline is measured along all horizontal axes and \( \dot{w} \), the intersectoral wage differential expressed as a fraction of the nonacademic wage \( -\left(\frac{w_a - w_n}{w_n}\right) \), is measured on all vertical axes.

Panel (a) shows the total supply of manpower at a point in time. Because of the time requirement in production, total supply is fixed in

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Graphical Representation of a Segmented Market for Doctorate Manpower

FIGURE 4

(a) Total Supply of Doctorate Manpower

(b) Academic Demand for Doctorate Manpower

Period per Quantity per
Graphical Representation of a Segmented Market for Doctorate Manpower

FIGURE 4 (cont.)

In the academic sector (S-I-d) and doctorate manpower not employed Doctorate Manpower employed in the Nonacademic sector Supply of Doctorate Manpower to the Nonacademic

Quantity per period Quantity per period
the short run. In panel (b) is the academic demand curve for manpower. To simplify the discussion it is assumed that $w_n$ is constant; a decrease in $w$, then, can be interpreted also as a decrease in $w_a$. The academic demand for labor curve is downward sloping in accordance with the law of demand. In panel (c) is the supply of manpower to the nonacademic sector. As the intersectoral wage differential becomes smaller, non-academic jobs become relatively more attractive and the quantity of labor supplied to that sector increases. Finally, panel (d) includes two curves: the supply of labor to the nonacademic sector ($S_n$), and the total supply of labor not employed in academe ($S_T-D_a$). The difference between the two curves in panel (d) is the quantity of labor not employed in academe and not supplied to nonacademic employers; that is, the quantity of unemployed manpower.

Figure 4 illustrates the impact of changes in the intersectoral wage differential on Ph.D. unemployment. Suppose initially that the wage differential is equal to zero ($w=0$). The total supply of manpower ($S_T$ in panel (a)) minus academic employment ($E_a^O$ in panel (b)), or the

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5 The slope of the $S_n$ curve depends on a number of variables which are discussed in the following section. For present purposes, the relevant variables are $v$, the rate at which vacancies appear in the academic sector, and the fraction of rent seeking that takes the form of either unemployment or underemployment. An increase in $v$, ceteris paribus, implies an increased probability of obtaining employment in academe and therefore an increase in the amount of rent seeking activities that are undertaken and a decrease in the supply of manpower to the nonacademic sector at every possible $w$ ($w>0$). Thus an increase in $v$ will cause the $S_n$ curve to rotate to the left around point A. Similarly, as the fraction of rent seeking which takes the form of unemployment rises, the $S_n$ curve rotates to the left around point A.
amount of labor that could potentially flow into nonacademic jobs, is
equal to OC (in panel (d)). When \( \dot{w} = 0 \), nonacademic jobs are as desirable
as academic jobs, so all workers not employed in academe will move into
industry; the quantity of labor supplied to the nonacademic sector will
equal OC \( (=S_{T}-E_{a}^{O}) \), as shown in panel (c). To summarize, all labor not
employed in academe will be employed in industry, and there will be no
unemployment, when \( \dot{w} = 0 \). This is shown in panel (d).

Suppose now that the academic wage rises above the nonacademic wage
and \( \dot{w} = \omega_{0} \). Now, academic employment is equal to OA (panel (b)), and
total manpower minus academic employment is OE \( (=S_{T}-OA) \) in panel (d).
Of the OE units of labor which are available for employment outside of
academe, OB are actually supplied to the nonacademic sector (panel (c))
and the remainder, BE units (panel (d)), are searching for academic jobs
(unemployed).

More generally, the horizontal distance between the two curves in
panel (d) is the amount of unemployment that will occur at various
levels of \( \dot{w} \). The distance between the two curves increases as \( \dot{w} \) in-
creases, indicating that as the wage differential becomes larger more
Ph.D.s will accept unemployment in the current period so as to improve
their chances for academic employment in future periods.

While this analysis does not include all of the causes of Ph.D.
unemployment, it can explain the dramatic increase observed in recent
years. What is attractive about this explanation is that it accounts
for the prolonged duration of the surplus. Some analysts see Ph.D.
unemployment as a transitory phenomenon that should disappear once
suppliers adjust to the fall in demand for their services that occurred in about 1970. It is suggested here that Ph.D. unemployment is a voluntary (and rational) response by individuals to the existence of rents in academic jobs, and as such it should continue for as long as colleges pay more than nonacademic employers—potentially a long time.6

The Incidence of Unemployment By Discipline

Tables 1 and 2 (in Chapter 1) provide data showing that unemployment among new Ph.D.s ranges from relatively low in some disciplines to very high in others. It is, of course, possible to argue that unemployment in, say, history is more severe than in chemistry because historians do not adjust to changing market conditions while chemists do. But if that argument is correct, why is the unemployment rate among economists—individuals trained to understand the operation of markets—greater than that among chemists? Clearly an alternative explanation is required. After formalizing the rent-seeking unemployment model presented above, the present section provides that explanation.

It is helpful to begin by making a number of simplifying assumptions. First, individuals holding the Ph.D. in each discipline are assumed to be homogeneous. By ignoring differences between job applicants it is possible to concentrate on the average individual and to ignore the

6This may explain Stone's observation that enrollments in graduate history programs are not responsive to high unemployment rates. In his words, "Sharp reductions in enrollments have so far taken place by administrative decision rather than by student choice." Lawrence Stone, "The AHA and the Job Market for Graduate Students," AHA Newsletter, March, 1972, p. 25.
"special cases" that might otherwise appear. The homogeneity assumption implies, among other things, that job applicants have identical preferences and qualifications, and therefore equal opportunities for employment under a given set of circumstances. Next, individual's are assumed to maximize their personal utilities. Third, it is assumed that all individuals are risk neutral. Finally, it is assumed that job search can be undertaken only during periods of unemployment and that search costs consist entirely of earnings foregone during such periods.

Under these conditions, equilibrium in the doctorate labor market requires that there be no net return to moving between sectors. In other words, for the marginal worker the present value of lifetime employment in the nonacademic sector must just equal the expected present value of pursuing an academic career. Mathematically, for the marginal worker planning to pursue an academic career,

\[
\sum_{t=0}^{n} \frac{P_t w_a}{(1+i)^{t+1}} = \sum_{t=0}^{n} \frac{w_n}{(1+i)^{t+1}},
\]

where \(P_t\) is the probability of being employed in academe in period \(t\), \(i\) is the rate of discount, and \(n+1\) is the expected working life of the worker in years. Note that \(w_a\) and \(w_n\), the academic and nonacademic real wages, are assumed to remain constant over time.

At the beginning of any contract period, the probability of academic employment for that period depends on one's position in the labor market. For those who hold nonacademic jobs, the probability of academic employment is zero: It was assumed that job search can be undertaken only by
the unemployed. To calculate the probability of finding academic employment for the unemployed, recall that all applicants were assumed to have identical abilities and preferences and to invest the same quantity of resources in job search. This implies that jobs will be awarded randomly among job searchers; the probability of success is equal to the total number of positions divided by the total number of applicants. This can be represented mathematically as

\[
p = \frac{v E_a}{v E_a + U}
\]

where \(p\) is the probability that an unemployed applicant will find academic employment, \(v\) is the rate at which academic jobs become vacant, \(U\) is the number of unemployed job searchers, and \(u (=U/E_a)\) is the ratio of unemployment to academic employment. For those with academic jobs during the preceding period, the probability of academic employment during the present period is equal to the probability that they remain at their last position (=1-v).

Since over time individuals move between academic employment, unemployment, and nonacademic employment, the probability that an individual will have an academic job in year \(t\) can be expressed in general terms as

\[p(t) = \frac{v E_a}{v E_a + U}
\]

7Due to faculty quits, deaths, retirements, and discharges.
(3) \[ P_t = (1 - P_{t-1})p + P_{t-1}(1 - v) = p \sum_{j=0}^{t} (1 - p - v). \]

Substituting (3) into (1) and solving,

\[ \frac{w_a}{w_n} = \frac{(p + v)}{p} \cdot \frac{1}{1 - \frac{i(1-p-v)}{(v+p+i)(1+1)-(n+1)} - 1} \]

Subtracting one from both sides of (4) and replacing terms,

\[ \hat{w} = \frac{1}{(1+u+v)} 1 + \frac{\hat{u}(i-v) - iv^2}{1-(1+i)^{-1}(n+1)} \]

Equation (5) can, in principle, be solved for \( \hat{u} \) to obtain an equation of the general form

\[ \hat{u} = f(\hat{w}, v, i, n) \quad f_1, f_2, f_4 > 0, f_3 < 0. \]

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8 This relationship was expressed incorrectly by Mincer as


9 Equations (4) through (6) are derived in the mathematical appendix to this chapter.
Next, consider the aggregate unemployment rate in a discipline:

\[ u_A = \frac{U}{(E_a + E_n + U)}. \]

While the aggregate unemployment rate is dependent on the same variables which affect \( \hat{u} \), it varies with the fraction of employed Ph.D.s working in academe. Define this fraction \( k = \frac{E_a}{E_a + E_n} \).

Then

\[ u_A = \frac{k\hat{u}}{1 + k\hat{u}} , \tag{7} \]

and \( \partial u_A / \partial k = \hat{u} / (1 + k\hat{u})^2 > 0. \) Other things remaining the same, the larger the academic sector the more rent-seeking, and therefore unemployment, will occur.

Note that some individuals are more likely to be unemployed rent-seekers than others. Those who received degrees several years in the past and then accepted nonacademic jobs may be unwilling to join the ranks of the rent-seeking unemployed because of the psychic costs of being unemployed and of changing jobs, because of benefits (e.g., pension, vacation, seniority) that must be sacrificed when leaving a job, because of the difficulty of adjusting to the academic mix of pecuniary and nonpecuniary income, and because the number of years they have remaining in their careers may not be great enough to make the higher academic wage attractive.\(^10\) Similarly, individuals who lost academic jobs may be unwilling to accept unemployment. The number of years they have in their careers may not be great enough to justify a year of

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\(^{10}\) Recall that \( \partial u / \partial n < 0. \)
unemployed job search, and the fact that a large fraction of their past income was nonpecuniary may mean that their pecuniary wealth is not sufficient to support them for any length of time.

Of all Ph.D.s, it appears that new Ph.D.s are best able to undergo unemployed job search. They have long careers ahead of them (n is large), are accustomed to living on a small income, have no pensions (or other job-related benefits) to lose, are probably less affected by the thought of being unemployed, and are probably more optimistic about their chances of landing an academic job than "old" Ph.D.s.\(^\text{11}\) The expectation, then, is that the unemployment rate for new Ph.D.s will be higher than the aggregate unemployment rate, which in turn will be higher than the unemployment rate for individuals who received the Ph.D. several years earlier.

Why do unemployment rates vary widely across disciplines? The explanation offered here is that (except for a small amount of structural and frictional unemployment) Ph.D. unemployment is a rent-seeking activity and, like other economic activities, will be pursued more intensively as the reward for doing so increases. What this implies, first of all, is that unemployment rates will be highest in those fields where the most rent exists. According to this hypothesis, unemployment

\(^\text{11}\)"Despite a projected surplus of approximately 40,000 Ph.D.s by 1985. . .(the executive director of the Higher Education Research Institute) said, most doctoral students in the humanities tend to view their own employment prospects as better than average. 'If only one in ten will get a job,' he said, 'nine in ten believe they will be the one to get it.'" Ellen K. Coughlin, "Can New Ph.D.s Find Employment and Satisfaction Outside Academe?" Chronicle of Higher Education, Vol. , No. (March 27, 1978), p. 10.
may be more severe in history than in chemistry because historians in academe are overpaid (relative to market equilibria) to a greater extent than chemists in academe. The relative size of the academic sector was also shown to affect the doctorate unemployment rate. Rent-seeking unemployment is the result of what economists usually describe as a market distortion; the greater the distortion that exists is a market of some given size, the more unemployment can be expected to occur. Finally, unemployment rates should vary among those in different age groups. As an individual becomes older, he has fewer years remaining in his career to capture academic rents. Since the reward to rent-seeking declines with age, so should the amount of rent-seeking unemployment. Two other factors, the rate at which academic jobs are vacated (v) and the discount rate (i), also affect the amount of Ph.D. unemployment, but since these variables are probably about the same for all disciplines they cannot be used to explain differences in the unemployment rate across disciplines.

In short, the "rent-seeking unemployment rate" in a discipline is predicted to be related to certain variables as described by the following equation:

\( u_A = f(\hat{w}, k, n, i, v) \quad f_1, f_2, f_3, f_5 > 0, f_4 < 0. \)

The Long-Run Supply of Doctorate Manpower

When college faculty are paid more than the market-clearing wage, some fraction of the doctorate labor force has an incentive to prefer unemployment to employment in the nonacademic sector. The preceeding
discussion considered that possibility, but did so within the context of a short-run model where the total supply of doctorate manpower was assumed to remain constant. Dropping that assumption makes it possible to investigate the impact of the intersectoral wage differential on the supply of Ph.D.s in the long run.

Individuals with bachelor's degrees will pursue Ph.D.s if the net reward from doing so is positive. Entry into the doctorate labor market will occur, then, until the following (equilibrium) condition is satisfied:

\[
\sum_{t=g+1}^{n} \frac{w_B}{(1+i)^{t+1}} - \sum_{t=0}^{g} \frac{C_t}{(1+i)^{t+1}} = \sum_{t=0}^{n} \frac{w_B}{(1+i)^{t+1}}
\]

where \(w_B\) is the real wage earned by individuals with bachelor's degrees, \(C_t\) is the opportunity cost of attending graduate school in year \(t\), and \(g+1\) is the number of years of graduate study required to complete all Ph.D. requirements. (\(w_n\), \(n\), and \(i\) have been previously defined.)

The intersectoral wage differential affects one's decision to pursue the Ph.D. by affecting the terms \(w_n\) and \(C_t\). To begin with, suppose that no wage differential exists in the doctorate labor market; \(w_a = w_n = w_o\), where \(w_o\) is the market-clearing wage. Now, let \(w_a\) rise above \(w_o\). As a result, two things will happen: First, employment in the academic sector will fall (because of the law of demand). Some of those losing academic jobs will become unemployed job searchers, and others will accept nonacademic employment. Second, the existence of a wage differential will cause some workers to leave the nonacademic sector in search of academic jobs. In the first instance, the supply of manpower
to the nonacademic sector has increased, causing $w_n$ to fall; in the second, the supply of labor to the nonacademic sector has decreased, causing $w_n$ to rise. Which of these tendencies dominates depends on a number of factors, including the demand elasticities for labor in the two sectors. In any event, it is unlikely that $w_n$ will remain at $w_o$ after the introduction of the wage differential, so in the long run the quantity of doctorate manpower will be either greater or less (depending on whether $w_n$ exceeds or is exceeded by $w_o$) than it would otherwise have been.

Less ambiguous is the effect "high" faculty wages have on the cost of attending graduate school. Suppose that to begin with $w_a = w_n$, and then let $w_a$ rise above $w_n$. Now that faculty salaries have risen, colleges incur higher production costs than before. Because of this, colleges will find it necessary to pass these costs on to customers (students) by raising prices (tuitions). As tuitions rise, so does the cost of graduate study; as the cost of graduate study rises, the net return to graduate study falls— and the supply of doctorate manpower is reduced accordingly. (It is possible to extend this conclusion by noting that as tuitions rise the number of undergraduate students will also fall, thereby reducing the number of individuals eligible to attend graduate school. This, too, reduces the supply of Ph.D.s.)

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In summary, while it is likely that a differential between academic and nonacademic wages will affect the long-run supply of Ph.D.s, it is impossible to determine a priori whether the impact will be positive or negative.

Mathematical Appendix

The equilibrium condition in the doctorate labor market is

\[ \sum_{t=0}^{n} \frac{w_a P_t}{(1+i)^{t+1}} = \sum_{t=0}^{n} \frac{w_n}{(1+i)^{t+1}}, \]

where

\[ P_t = p \sum_{j=0}^{t} (1-p-v)^j. \]

Thus,

\[ \sum_{t=0}^{n} \frac{w_a p \sum_{j=0}^{t} (1-p-v)^j}{(1+i)^{t+1}} = \sum_{t=0}^{n} \frac{w_n}{(1+i)^{t+1}}. \]

Define \( \alpha = (1-p-v) \), \( \beta = (1+i) \).

\[ \sum_{j=0}^{t} \frac{w_a}{\beta} \sum_{j=0}^{t} (\alpha^j) = \sum_{t=0}^{n} \frac{w_n}{\beta^t}. \]

Since \( \sum_{j=0}^{t} \alpha^j = \frac{1-\alpha^{t+1}}{1-\alpha} \),

\[ \sum_{t=0}^{n} \frac{w_a}{\beta^t} \left( \sum_{j=0}^{t} (\alpha^j) \right) = \sum_{t=0}^{n} \frac{w_n}{\beta^t}. \]
Expanding summations,
\[ \sum_{t=0}^{n} \left( \frac{1}{\beta} \right)^{t+1} = \frac{\left( \frac{1}{\beta} \right)^{n+1} - 1}{1-\beta} \]
and
\[ \sum_{t=0}^{n} \left( \frac{\alpha}{\beta^t} \right)^{t+1} = \frac{\alpha \left( \frac{\alpha}{\beta} \right)^{n+1} - \alpha}{\alpha - \beta} . \]

Substituting these terms into (3) yields
\[ \omega \left( \frac{p}{1-\alpha} \right) \frac{\left( \frac{1}{\beta} \right)^{n+1} - 1}{1-\beta} = \frac{\alpha \left( \frac{\alpha}{\beta} \right)^{n+1} - \alpha}{2-\beta} = \omega_n \frac{\left( \frac{1}{\beta} \right)^{n+1} - 1}{1-\beta} . \]

Before proceeding, it is useful to examine the term \( \alpha \left( \frac{\alpha}{\beta} \right)^{n+1} \). This can be rewritten as
\[ (1 - p - v) \left( \frac{1-p-v}{1+i} \right)^{n+1} \]
Since \( 1-p-v < 1 \) under normal circumstances and \( 1+i > 1 \), the second bracketed expression will approach zero as \( n \) becomes larger. For example, assume that \( p = .7, v = .1, i = .08, \) and \( n = 10 \) (i.e., the expected working life is 11 years). Then
\[ \left( \frac{1-p-v}{1+i} \right)^{n+1} = .000000009 \]
Multiplying this by \( 1-p-v = .2 \) reduces the value of the entire term even more. To simplify the discussion, then, the term will be assumed to equal zero.

Replacing \( \left( \frac{1}{\beta} \right)^{n+1} \) with \( \gamma \) and letting \( \alpha \left( \frac{\alpha}{\beta} \right)^{n+1} = 0 \), equation (4) can be written as
Thus,

\[
\frac{w_a}{w_n} = \frac{1-\alpha}{P} \frac{1}{1 + \frac{\alpha(1-\beta)}{(\alpha-\beta)(\gamma-1)}}
\]

Define \( \dot{w} = \frac{w_a - w_n}{w_n} = \frac{w_a}{w_n} - 1 \). Then

\[
\dot{w} = \frac{1-\alpha}{P} \frac{1}{1 + \frac{\alpha(1-\beta)}{(\alpha-\beta)(\gamma-1)}}
\]

Replacing terms,

\[
\dot{w} = (1+u+v) \frac{1}{1 + \frac{\dot{u}(1-iv) - iv^2}{(1-\gamma)(1+v+i) + u(v+i)}} - 1
\]

Equation (8) is the same, with minor modifications, as equation (5) in the text of Chapter 4.

Solving (8) for \( \dot{u} \),

\[
\dot{u}^2 + Bu + C = 0
\]

where

\[
A = (1-\gamma)(v+i) \\
B = (1-\gamma) \left(1 + (v+i)(1-v-\dot{w}) - 1\frac{1-v}{1-\gamma}(\dot{w}+1)\right) \\
C = (1-\gamma) \left((1+v+i)(v-w) + \frac{iv^2}{1-\gamma}(w+1)\right)
\]
Solving the quadratic in (9) for its largest root,

\[(10) \quad \hat{u} = -B + \frac{(B^2 - 4AC)^{1/2}}{2A} \]

For \( \hat{u} \) to be positive, it must be the case that

\[-B + \frac{(B^2 - 4AC)^{1/2}}{2A} > 0 \]

Since \( A > 0 \), this is equivalent to

\[\frac{(B^2 - 4AC)^{1/2}}{2A} > B\]

\[B^2 - 4AC > B^2\]

\[-4AC > 0\]

\[C < 0\]

Note that

\[C = (1-\gamma) (1+v+i)(v-\hat{w}) + \left(\frac{iv}{1-\gamma}\right)(\hat{w}+1)\]

\[(1-\gamma) > 0 \quad \text{for all } i > 0\]

\[v > 0\]

\[\cdot > \hat{w} > 0\]

Therefore it is necessary (but not sufficient) that \( \hat{w} > v \) for \( C \) to be negative (and for \( \hat{u} > 0 \)). More generally, if

\[\hat{w} > \frac{iv^2 + v(1-\gamma)(1+v+i)}{(1-\gamma)(1+v+i) - iv^2} > v\]

\(^{n_1}\)

\(^{n_2}\)

\(^{n_1}\) is not known with certainty, but available evidence suggests that it is about .08. See David G. Brown, The Mobile Professors (Washington, D.C.: American Council on Education, 1967), chapter 3.

\(^{n_2}\) It is necessary that \( \hat{w} > 0 \) for rent-seeking unemployment to exist. Since this chapter is about rent-seeking unemployment, it is assumed that \( \hat{w} > 0 \).
then $c > 0$. Under normal circumstances, this is equivalent to saying that $\dot{w}$ must be slightly larger than $v$, as shown by the following table. Given are values of the $n$ bracketed term above for different values of $v$, $i$, and $n$.

<table>
<thead>
<tr>
<th>$v$</th>
<th>$i=0.08$</th>
<th>$i=0.08$</th>
<th>$i=0.12$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n=15$</td>
<td>$n=25$</td>
<td>$n=15$</td>
</tr>
<tr>
<td>0.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.02</td>
<td>0.02004</td>
<td></td>
<td>0.02005</td>
</tr>
<tr>
<td>0.04</td>
<td>0.04168</td>
<td>0.04014</td>
<td></td>
</tr>
<tr>
<td>0.06</td>
<td>0.06038</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.08</td>
<td>0.08067</td>
<td>0.08055</td>
<td></td>
</tr>
<tr>
<td>0.10</td>
<td>0.10105</td>
<td></td>
<td>0.10129</td>
</tr>
<tr>
<td>0.12</td>
<td>0.12152</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In each instance, $\dot{w}$ must be slightly larger than $v$ for rent-seeking unemployment to occur. This requirement is not as restrictive as it may first appear: as $w$ rises it is likely that $v$ will fall. In what follows, it is assumed that $\dot{w} > v$.

To determine the impact of a change in $\dot{w}$ on unemployment, differentiate (10) with respect to $\dot{w}$. In general terms,

$$\frac{\partial u}{\partial \dot{w}} = \frac{\partial u}{\partial A} \frac{\partial A}{\partial \dot{w}} + \frac{\partial u}{\partial B} \frac{\partial B}{\partial \dot{w}} + \frac{\partial u}{\partial C} \frac{\partial C}{\partial \dot{w}}$$

Since $\frac{\partial A}{\partial \dot{w}} = 0$, only the latter two terms are of interest. Differentiating,
\[ \frac{\partial u}{\partial B} = -\frac{1}{4A^2} + \frac{B}{2A(B^2 - 4AC)^{1/2}} \]

\[ \frac{\partial B}{\partial w} = -(1-\gamma)(v+i) + i(1-v) \]

\[ \frac{\partial u}{\partial C} = -\frac{1}{(B^2 - 4AC)^{1/2}} \]

\[ \frac{\partial C}{\partial w} = iv^2 - (1-\gamma)(1+v+i) \]

Because \( \frac{\partial u}{\partial w} \) contains both positive and negative elements, its value cannot be determined \textit{a priori}. To evaluate the term, it is necessary to assume specific values for \( i, n, v, \) and \( w \). Recall that \( w \) must be greater than \( v \) for rent-seeking unemployment to occur. Suppose that the average career is 25 years \( (n=24) \), that individuals discount future payments and receipts at 8% annually \( (i=0.08) \), that jobs in the academic sector are vacated once every ten years on average \( (v=0.1) \), and that \( w_a \) exceeds \( w_n \) by twenty percent \( (\hat{w}=0.2) \). Then

\[ \frac{\partial u}{\partial w} = (-7.1857)(-0.22572) - (1.1923)(-1.00852) = 2.8245 \]

Interpreting this, for every one percent increase in \( \hat{w} \) there will be an increase in \( \hat{u} (=U/E_a) \) of nearly three percent.

Using a similar technique that is possible to show also that under normal circumstances

\[ \frac{\partial u}{\partial i} > 0 . \]
As the rate of discount rises, the present value of future (academic) rents falls, so individuals are less willing to engage in unemployed job search.

\[ \frac{\partial u}{\partial v} > 0. \]

As jobs in the academic sector are vacated more often, the probability of finding academic employment rises so unemployment becomes more likely.

\[ \frac{\partial u}{\partial n} > 0. \]

The longer an individual's career, the longer the period during which to receive academic rents so individuals are more willing to seek academic employment.
Chapter 5

EMPIRICAL EVIDENCE

Introduction

The explanation for Ph.D. unemployment offered by this study is based on two independent theories: the property rights theory of the firm (Chapter 3), and the theory of rent-seeking unemployment (Chapter 4). In each instance, decision makers were assumed to respond to the economic incentives which they confront; as some activity becomes more (less) rewarding, individuals are presumed to pursue it to a greater (lesser) extent than before. This, of course, is the same idea which underlies the law of demand. From that foundation were derived a number of hypotheses about the compensation policies of various types of firms and about job search activities in the doctorate labor market. These hypotheses include the following:

1. Public and nonprofit private colleges will pay doctorate manpower (faculty) more than for-profit firms, when both pecuniary and nonpecuniary income are considered.

2. Faculty salaries will tend to equalize across disciplines in public and nonprofit colleges.

3. Faculty salaries at public colleges will exceed those at private-independent colleges.

4. Faculty salaries at private-independent colleges will exceed those at church-related colleges.
5. Faculty salaries at prestige-oriented colleges will exceed those at other colleges.

6. Rent-seeking unemployment in a discipline will be positively related to the differential between the academic and the nonacademic wage, to the size of the academic sector relative to the nonacademic sector, to the number of years the holders of doctorates have remaining in their careers, and to the vacancy rate in the academic sector. Rent-seeking unemployment will be inversely related to the rate at which individuals discount future receipts and expenditures.

Statistical techniques exist which can be used to evaluate the degree to which these predicted outcomes approximate actual conditions. This chapter applies a number of those techniques to test the hypotheses listed above.

A Digression: Faculty Nonpecuniary Income

When working conditions vary among jobs in a competitive labor market, manpower will move from less-pleasant jobs to more-pleasant jobs, driving wages up in the former and down in the latter. When adjustment is complete, individuals employed in less-pleasant jobs will be compensated for the added disutility they suffer vis-a-vis other workers. This differential—known as a compensating wage differential—will be such that the net desirability of employment is the same in all jobs
(for the marginal worker). Wage differentials among workers with the same skills in a competitive labor market, then, can be attributed to differences in working conditions.\(^1\)

This complicates the task of testing whether faculty salaries exceed nonacademic salaries, for now there are two reasons for pecuniary wages in the two sectors to differ: the compensation policies of colleges may be inefficient, and academic jobs may be more pleasant or less pleasant than nonacademic jobs. But if compensating wage differentials can be removed from income data, then whatever differentials remain can be attributed to inefficient compensation policies of colleges.

Before proceeding, it is necessary to clarify a point of terminology. While it is acceptable to say that individuals in less—pleasant jobs receive compensating wage differentials, it is equally acceptable to refer to compensating wage differentials foregone by individuals in more—pleasant jobs as nonpecuniary (or nonmonetary) income. In both instances, net income is the same for both types of jobs, so the two terms will be used interchangably.

Under present circumstances, it is widely agreed that academic employment is more pleasant than nonacademic employment because faculty members receive certain benefits that Ph.D.s employed elsewhere usually do not. These benefits include:

---

\(^1\)Or to disequilibrium. This possibility is considered below.
a. health care at reduced cost through the college clinic,
b. tuition waivers for family members who attend college where the faculty member is employed,
c. a working "year" of about eight months,\(^2\)
d. tenure, which guarantees lifetime employment (at the faculty member's option) except in very unusual circumstances,\(^3\)
e. less risk of reductions in income over the faculty member's career,\(^4\)
f. leaves of absence from working duties, often with full or partial compensation,
g. only nominal supervision by superiors,\(^5\)

\(^2\)The standard academic year is approximately thirty-two weeks. The other twenty weeks in the year are absorbed by various "breaks" (e.g., Christmas and spring) and by summer vacation. Faculty members who teach during the summer session normally have about two and one-half months of "vacation" annually.

\(^3\)One study estimates that faculty salaries are reduced by approximately $372 (in 1972 dollars) by tenure. That is, salaries would rise by $372 if tenure were eliminated. See G. W. McLaughlin, J. C. Smart, and J. R. Montgomery, "Factors Which Comprise Salary," Research in Higher Education, Vol. 8, No. 1 (1978), pp. 67-82.


\(^5\)According to a recent survey of professionals—including lawyers, doctors, MBAs, and engineers—Independence is the most important aspect of employment for individuals in academe. Less important are intellectual challenge, money, security, prestige, and power. See W. Kyer West, "Project '77: MBAs Look at Their World," MBA, Vol. 11, No. 7 (July, 1977), pp. 35-41.
h. on-duty time to undertake projects which augment the faculty member's income—e.g., consulting work and research.  

Experience suggests that these benefits are highly valued by most individuals with doctorates; many new graduates refuse even to consider the possibility of nonacademic employment.  

There are at least two methods of estimating the value of faculty nonpecuniary income. One, used by Richard Freeman, involves assuming that the only difference between academic and nonacademic pecuniary wages is the nonpecuniary income received by faculty. In his words, "DLI's (discounted lifetime incomes of Ph.D.s in various disciplines) inclusive of nonpecunary income... (are) calculated by estimating the return to persons in the industrial sector..." This approach is flawed by its neglect of all other factors which might cause pecuniary incomes to differ between sectors. Since this dissertation is based on the premiss that other such factors exist, Freeman's method of estimating nonpecuniary faculty income is not acceptable here.  

A second technique is based on the idea that compensating wage differentials equalize the net desirability of employment in all sectors,

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6 Consulting work adds to present income and published research leads to higher future income. See McLaughlin, Smart, and Montgomery, "Factors Which Comprise Salary."


whereas other wage differentials make some jobs more desirable than others. To the extent that individual behavior is affected by economic considerations, then, compensating differentials are those which do not affect career decisions and all other differentials motivate mobility between jobs. This idea is important for estimating the value of non-pecuniary faculty income. If it is possible to identify situations where doctorate manpower is unresponsive to differences between non-academic and academic pecuniary wages, then these differences are equal to the nonpecuniary advantage of academic employment.

To utilize this second approach, one must define conditions under which it is possible to say that manpower is unresponsive to pecuniary wage differentials. The first is that the proportion of doctorates employed in the academic sector must remain approximately constant from one year to the next. If the proportion is rising, then the academic wage (pecuniary plus nonpecuniary) must be greater than the nonacademic wage, and vice versa. In that event, the pecuniary wage differential is either greater than or less than the compensating differential, so the latter is not observable. The second condition is that rent-seeking unemployment cannot exist, for if it does the academic wage (including nonpecuniary benefits) is above the nonacademic wage and the compensating differential is greater than the observed differential. Finally, unemployment cannot be "too" low because if it is there will be unfilled positions in one or both sectors, and therefore the market will be in disequilibrium (so the observed wage differential will be unrelated to the compensating differential).
It is difficult to establish precisely when these last two conditions are satisfied—when the unemployment rate is neither too high nor too low. An examination of unemployment rates of doctoral scientists in 1973, a year of moderate economic growth and of slowly expanding college enrollments, suggests that the rate of frictional unemployment among Ph.D.s falls in the range of 0.5 to 1.2%. If the unemployment rate is outside these boundaries, it is assumed that either rent-seeking unemployment or unfilled vacancies exist, so the observed wage differential is not equal to the compensating differential (nonpecuniary faculty income).

A survey of 1977 data, the most recent available, shows that only three disciplines—physics, chemistry, and engineering—meet the equilibrium requirements described above. Tables 3 and 4 provide the relevant information.

Column (4) in Table 5 suggests that the nonpecuniary benefits to academic employment are valued at about $5,200. Inclusion of engineering may bias the estimate downward, however, since the employment pattern of academic engineers is atypical. Engineers employed in academe are more likely to work in universities that grant graduate degrees than physicists and chemists in academe. Because four-year

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10 The arithmetic mean of the three items in column (4) is $5167.
TABLE 3
Proportion of Employed Ph.D.s Working in Four-Year Colleges and Industry By Fields of Doctorate,
1975 and 1977

<table>
<thead>
<tr>
<th>Field of Doctorate</th>
<th>% Employed by Colleges (1975)</th>
<th>% Employed by Colleges (1977)</th>
<th>(3)-(2)</th>
<th>(6)-(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>52.7</td>
<td>52.1</td>
<td>-0.6</td>
<td>28.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>Chemistry</td>
<td>33.4</td>
<td>32.9</td>
<td>-0.5</td>
<td>54.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>53.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.5</td>
</tr>
<tr>
<td>Engineering</td>
<td>37.2</td>
<td>36.5</td>
<td>-0.7</td>
<td>49.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>48.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field of Doctorate</th>
<th>% Unemployed and Seeking Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>1.1</td>
</tr>
<tr>
<td>Chemistry</td>
<td>1.2</td>
</tr>
<tr>
<td>Engineering</td>
<td>0.6</td>
</tr>
</tbody>
</table>

TABLE 5

Median Annual* Salaries of Full-Time Employed Ph.D.s in
Selected Fields of Employment by Type of Employer, 1977

<table>
<thead>
<tr>
<th>Field of Employment</th>
<th>Type of Employer</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Four-Year Colleges</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td></td>
<td>$24,600</td>
<td>$29,800</td>
<td>$5,200</td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td></td>
<td>$22,900</td>
<td>$29,500</td>
<td>$6,600</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td>$26,400</td>
<td>$29,900</td>
<td>$3,500</td>
<td></td>
</tr>
</tbody>
</table>

*Academic salaries were multiplied by 11/9 to convert academic years to industrial working years.

colleges pay lower salaries than graduate-degree universities, salaries of academic engineers will be greater than those of physicists and chemists in academe, even though in identical circumstances all may receive comparable nonpecuniary benefits. In light of these comments, it seems advisable to place relatively more emphasis on the differentials in physics and chemistry when estimating nonpecuniary faculty income; they suggest a value of approximately $6,000\textsuperscript{11}—considerably more than Freeman's calculations would indicate.\textsuperscript{12}

Tests of Hypotheses

Statistical tests cannot prove one's conjectures; they can only indicate the degree to which actual conditions approximate predicted

\textsuperscript{11}While the annual value of nonpecuniary faculty benefits is approximately $6000, this $6000 is not taxable. With a marginal tax rate of .25, $6000 of non-taxed income is equivalent to $8000 of taxable income. This latter figure should be used when comparing nonpecuniary benefits with the (taxable) pecuniary benefits of academic employment.

\textsuperscript{12}Freeman estimated "that educational employment is marginally worth $750 to $1000 in nonpecuniary income" in 1964 dollars. Richard Freeman, The Market for College Trained Manpower, p. 95.

Assuming that the market value of faculty nonpecuniary benefits rises at the same rate the prices of other goods rise, it is appropriate to inflate Freeman's estimates by the compounded annual rate of inflation from 1964 to 1977 and compare his findings with those arrived at here. In 1964 the implicit price deflator for GNP was 108.9, and in 1977 it was 153.9. (1958=100); the compound annual rate of inflation was slightly less than three percent. With an inflation rate of three percent, Freeman's estimated range of $750 to $1000 in 1964 becomes $1100 to $1470 in 1977—less than one-fourth that arrived at here.
outcomes over a limited range of experience. With that in mind, the present section applies various techniques in testing the hypotheses listed above.

Faculty Salaries Exceed Nonacademic Salaries. Chapter 3 examined the incentive that individuals in various types of firms have to minimize the cost of producing a given quantity and quality of output. Because of the attenuation of property rights in public and nonprofit enterprises, it was predicted that public and nonprofit private colleges will pay doctorate manpower (faculty) more than for-profit firms when both pecuniary and nonpecuniary income are considered.13

Table 6 provides data on pecuniary salaries in four-year colleges and in industry for sixteen different disciplines.14 Column (4) shows that the average difference between academic and nonacademic salaries for all disciplines is $2600—the pecuniary advantage to nonacademic employment is far less than three thousand dollars. Using either estimate of the nonpecuniary income received by faculty ($5200 or $6000), it would

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13 Support for this hypothesis is provided by the observation that in nearly all disciplines for which information is available Federal Government salaries (earned by Ph.D.s) exceed private sector salaries. In the humanities, the median annual salary in Federal Government is $28,900 while in industry it is $20,000 (information available for "all disciplines" only). For data, see National Research Council, Science, Engineering, and Humanities Doctorates in the United States: 1977 Profile (Washington, D.C.: National Research Council, 1978), tables 1.9 and 2.9.

14 Data for several social science disciplines—including economics, sociology, and political science—is not available for 1977; in the years for which those data are available, salaries in the humanities disciplines were not surveyed and information on Ph.D. unemployment is incomplete.
TABLE 6

Pecuniary Median Annual* Salaries of Full-Time Employed Ph.D.s in Four-Year Colleges and Industry by Field of Employment, 1977
(in thousands of dollars)

<table>
<thead>
<tr>
<th>Field of Employment (1)</th>
<th>Industry (2)</th>
<th>Four-Year Colleges (3)</th>
<th>(2)-(3) (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>27.7</td>
<td>22.7</td>
<td>5.0</td>
</tr>
<tr>
<td>Computer Science</td>
<td>26.7</td>
<td>24.3</td>
<td>2.4</td>
</tr>
<tr>
<td>Physics</td>
<td>29.8</td>
<td>24.6</td>
<td>5.2</td>
</tr>
<tr>
<td>Chemistry</td>
<td>29.5</td>
<td>22.9</td>
<td>6.6</td>
</tr>
<tr>
<td>Earth Science</td>
<td>28.7</td>
<td>23.6</td>
<td>5.1</td>
</tr>
<tr>
<td>Engineering</td>
<td>29.9</td>
<td>26.4</td>
<td>3.5</td>
</tr>
<tr>
<td>Agricultural Science</td>
<td>27.1</td>
<td>23.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Biological Science</td>
<td>27.3</td>
<td>22.8</td>
<td>4.5</td>
</tr>
<tr>
<td>Psychology</td>
<td>33.8</td>
<td>22.3</td>
<td>11.5</td>
</tr>
<tr>
<td>History</td>
<td>20.0**</td>
<td>21.8</td>
<td>-1.8</td>
</tr>
<tr>
<td>Art History</td>
<td>20.0**</td>
<td>19.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Music</td>
<td>20.0**</td>
<td>21.1</td>
<td>-1.1</td>
</tr>
<tr>
<td>Speech</td>
<td>20.0**</td>
<td>22.0</td>
<td>-2.0</td>
</tr>
</tbody>
</table>
TABLE 6 (cont.)

<table>
<thead>
<tr>
<th>Field of Employment</th>
<th>Industry (2)</th>
<th>Four-Year Colleges (3)</th>
<th>(2)-(3) (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophy</td>
<td>20.0**</td>
<td>20.0</td>
<td>0.0</td>
</tr>
<tr>
<td>English/Am. Literature</td>
<td>20.0**</td>
<td>20.3</td>
<td>-0.3</td>
</tr>
<tr>
<td>Modern Language</td>
<td>20.0**</td>
<td>19.9</td>
<td>0.1</td>
</tr>
<tr>
<td>mean</td>
<td>25.0</td>
<td>22.4</td>
<td>2.6</td>
</tr>
</tbody>
</table>

*Academic salaries were multiplied by 11/9 to convert academic years to industrial working years.

**Not enough information was available to calculate medians for these disciplines individually; the median salary of Ph.D.s from all humanities disciplines employed by industry was $20,000.

appear that individuals in most disciplines earn more in colleges than they do in industry. For reasons already considered, the pecuniary wage differential in three disciplines—physics, chemistry, and engineering—is approximately equal to faculty nonpecuniary income. Thus economic rent is not received by the marginal worker in these fields. In one discipline—psychology—the pecuniary wage differential is greater than faculty nonpecuniary income by several thousand dollars. This means that academic rent is negative for the marginal worker. If that is true, then the market for psychologists is in disequilibrium—a situation which should disappear in the future if nonacademic salaries are flexible. In the remaining twelve disciplines, the pecuniary wage advantage to nonacademic employment is less than the nonpecuniary advantage to academic employment: The academic wage (pecuniary plus nonpecuniary components) exceeds the nonacademic wage.

These conclusions clearly support the analysis of Chapter 3, but they are based only on comparisons of salaries between employment sectors and for that reason must be regarded as tentative. To test whether the intersectoral wage differentials are statistically significant, it is appropriate to calculate the following Z statistic for each discipline:

16 This ignores the possibility that the large differential is the result of differences in the qualifications of psychologists between employment sectors. (Psychologists in industry tend to be clinical psychologists, while psychologists in academe tend to have experimental training.)


18Z values are not calculated for physics, chemistry, or engineering since it was explained above that as an empirical matter the compensating
\[ Z = \frac{(w_a + CD) - w_n}{(SE_a)^2 + (SE_n)^2} \]

where \( w \) is a sample estimate of the median pecuniary wage, \( SE \) is the standard error of the median wage estimate, and \( CD \) is the imputed value of faculty nonpecuniary income. Subscripts denote employment sectors; \( a \), academe and \( n \), industry.

Unfortunately, standard errors are not available for the nonacademic sector in the humanities disciplines,\(^{19}\) so it is not always possible to calculate \( Z \) scores in the manner described above. Aside from not testing the hypothesis at all, the only acceptable alternative is to test whether the faculty wage in each humanities discipline differs from the wage earned by all humanities doctorates employed in industry. Because individuals in the latter group hold a wide range of jobs, the standard error of their median wage estimate is extremely large (\($1400\)). Using the standard error required by this alternative approach, then, will bias significance tests against hypothesis rejection—a fact which is unavoidable but which should be recalled when interpreting test results.

Table 7 reports test results when faculty nonpecuniary income is \$6000. In eleven of the thirteen disciplines for which \( Z \) values were differential in each of these disciplines is approximately equal to the described differential.

\(^{19}\)The National Research Council does not compute standard errors for estimates based on very small samples.
## Table 7
Tests of Significance*

<table>
<thead>
<tr>
<th>Field of Employment</th>
<th>$SE_{n}$</th>
<th>$SE_{a}$</th>
<th>2**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>$600</td>
<td>$200</td>
<td>1.581</td>
</tr>
<tr>
<td>Computer Science</td>
<td>$700</td>
<td>$500</td>
<td>4.185</td>
</tr>
<tr>
<td>Physics</td>
<td>$300</td>
<td>$300</td>
<td>(1)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>$300</td>
<td>$100</td>
<td>(1)</td>
</tr>
<tr>
<td>Earth Science</td>
<td>$500</td>
<td>$400</td>
<td>1.406</td>
</tr>
<tr>
<td>Engineering</td>
<td>$200</td>
<td>$100</td>
<td>(1)</td>
</tr>
<tr>
<td>Agricultural Science</td>
<td>$900</td>
<td>$300</td>
<td>2.741</td>
</tr>
<tr>
<td>Biological Science</td>
<td>$500</td>
<td>$100</td>
<td>2.942</td>
</tr>
<tr>
<td>Psychology</td>
<td>$900</td>
<td>$100</td>
<td>-6.074</td>
</tr>
<tr>
<td>History</td>
<td>$1400$(^{(2)})</td>
<td>$400</td>
<td>5.357</td>
</tr>
<tr>
<td>Art History</td>
<td>$1400$(^{(2)})</td>
<td>$500</td>
<td>3.969</td>
</tr>
<tr>
<td>Music</td>
<td>$1400$(^{(2)})</td>
<td>$500</td>
<td>4.776</td>
</tr>
<tr>
<td>Speech</td>
<td>$1400$(^{(2)})</td>
<td>$500</td>
<td>5.381</td>
</tr>
</tbody>
</table>
### TABLE 7 (cont.)

<table>
<thead>
<tr>
<th>Field of Employment</th>
<th>$SE_n$ (2)</th>
<th>$SE_a$</th>
<th>$Z^{**}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophy</td>
<td>$1400$</td>
<td>$300$</td>
<td>4.191</td>
</tr>
<tr>
<td>English/Am. Literature</td>
<td>$1400$</td>
<td>$200$</td>
<td>4.455</td>
</tr>
<tr>
<td>Modern Languages</td>
<td>$1400$</td>
<td>$100$</td>
<td>4.204</td>
</tr>
</tbody>
</table>

*The null hypothesis is that the academic wage (pecuniary plus nonpecuniary) is not significantly different than the industry wage when faculty nonpecuniary income is estimated at $6000.*

**At the .95 confidence level, the null hypothesis is rejected if $Z$ is greater than 1.96 or less than -1.96.

(1) $Z$ values were not computed for these disciplines for reasons discussed in the next text.

(2) $SE_n$ for "all" humanities disciplines combined.

**SOURCE:** $SE_n$ and $SE_a$ were provided by Betty Maxfield of the Commission on Human Resources, National Research Council, Salary data are from Table 6.
computed, the hypothesis that there is no significant differences between wages in the two employment sectors is rejected. In ten disciplines, Ph.D. salaries in four-year colleges are significantly greater than in industry; only in psychology does the salary paid in industry exceed that paid by colleges.

Essentially the same results are obtained when faculty nonpecuniary income is valued at $5200, as shown in Table 8. Computed Z values are of a smaller magnitude (except in psychology) than when the compensating differential was assumed to be $6000, but nine are significant even when the more conservative estimate is used. The industry wage exceeds the academic wage in one discipline, the academic wage is not significantly different than the industry wage in seven disciplines, and the academic wage exceeds the industry wage in eight disciplines. These results strongly support the proposition that in most fields there is an economic advantage to academic employment.

**Equalization of Faculty Salaries Across Disciplines.** The second prediction about faculty salaries came from assuming that faculty and administrators jointly agree on a compensation policy that does three things: minimizes conflict among academic departments, simplifies the task of administration, and provides insurance against large fluctuations in faculty salaries over time. The policy which provides these benefits is one that equalizes salaries across disciplines. Since there is no reason to believe that a similar policy-making process operates outside academe--indeed, it is probably the case that few profit-seeking firms
### TABLE 8

Tests of Significance*

<table>
<thead>
<tr>
<th>Field of Employment</th>
<th>Z**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>.316</td>
</tr>
<tr>
<td>Computer Science</td>
<td>3.255</td>
</tr>
<tr>
<td>Physics</td>
<td>(1)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>(1)</td>
</tr>
<tr>
<td>Earth Science</td>
<td>.156</td>
</tr>
<tr>
<td>Engineering</td>
<td>(1)</td>
</tr>
<tr>
<td>Agricultural Science</td>
<td>1.897</td>
</tr>
<tr>
<td>Biological Science</td>
<td>1.373</td>
</tr>
<tr>
<td>Psychology</td>
<td>-6.957</td>
</tr>
<tr>
<td>History</td>
<td>4.808</td>
</tr>
<tr>
<td>Art History</td>
<td>3.431</td>
</tr>
<tr>
<td>Music</td>
<td>4.238</td>
</tr>
<tr>
<td>Speech</td>
<td>4.843</td>
</tr>
</tbody>
</table>
**TABLE 8 (cont.)**

<table>
<thead>
<tr>
<th>Field of Employment</th>
<th>Z**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophy</td>
<td>3.632</td>
</tr>
<tr>
<td>English/Am. Literature</td>
<td>3.889</td>
</tr>
<tr>
<td>Modern Languages</td>
<td>3.634</td>
</tr>
</tbody>
</table>

*The null hypothesis is that the academic wage (pecuniary plus nonpecuniary) is not significantly different than the industry wage when faculty nonpecuniary income is estimated at $5200.*

**At the .95 confidence level, the null hypothesis is rejected if Z is greater than 1.96 or less than -1.96.**

(1) *Z values were not computed for these disciplines for reasons discussed in the text.*

**SOURCE:** $SE_n$ and $SE_a$ were provided by Betty Maxfield of the Commission on Human Resources, National Research Council, Salary data are from Table 6.
hire Ph.D.s from more than two or three disciplines—the expectation is that pecuniary salaries will vary less across disciplines in colleges than they do in industry.21

Unfortunately, it is not possible to test this hypothesis for all of the sixteen disciplines listed in Table 6 because of insufficient data on industry salaries in the humanities disciplines. A "second-best" approach is available, however: the hypothesis can be tested for the first nine disciplines listed. The appropriate statistical technique here is an F test which involves comparing the interdisciplinary variability of salaries in colleges with the interdisciplinary variability of salaries in industry. The null hypothesis is that salary variation across disciplines is the same in both sectors of employment. The F statistic is calculated by the formula

\[ F = \frac{s_{college}^2 / k}{s_{industry}^2 / n} \]

20 Ideally, total salaries (inclusive of nonpecuniary income) would be compared, but the technique used to estimate the value of nonpecuniary faculty benefits assumed that individuals in all disciplines receive the same amount of nonpecuniary income; testing the hypothesis with respect to total salaries would therefore bias the results in favor of the proposition advanced by this dissertation.

where $s^2$ is an unbiased estimate of the interdisciplinary variance of salaries. Subscripts denote sector of employment: $a$, academe and $n$, industry. Using data from Table 6 and performing the necessary calculations,

$$F = \frac{s^2}{n} = \frac{2.96}{1.61} = 2.98.$$ 

This value is not significant at the .95 confidence level, so the hypothesis that salaries show the same degree of variation across disciplines in the two sectors cannot be rejected. Similar results are obtained when testing the hypothesis using 1974 salary data.

A slightly different approach is to examine changes in salaries over time. If it is true that colleges try to maintain "academic equity," one would expect relatively wide use of "across the board" salary increases in academe. The expectation, then, is that salaries in colleges will rise at approximately the same rate in all disciplines and that more variation across disciplines will be observed in industry. Table 9 provides data relevant for testing this hypothesis for the period 1974 to 1977. Computing variances of annual rates of growth in salaries in the two sectors,

22 This F value is significant at the .9 confidence level, however.

23 Using 1974 data, the calculated F is 2.6, which is statistically significant at the .9 level of confidence.
Compounded Annual Rates of Growth of Median Annual* Salaries in Four-Year Colleges and Industry By Field of Employment, 1974 to 1977

<table>
<thead>
<tr>
<th>Field of Employment</th>
<th>Four-Year Colleges</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>5.68</td>
<td>7.72</td>
</tr>
<tr>
<td>Physics</td>
<td>8.80</td>
<td>6.60</td>
</tr>
<tr>
<td>Mathematics</td>
<td>3.46</td>
<td>3.48</td>
</tr>
<tr>
<td>Computer Science</td>
<td>4.17</td>
<td>0.89</td>
</tr>
<tr>
<td>Earth Sciences</td>
<td>7.87</td>
<td>12.42</td>
</tr>
<tr>
<td>Engineering</td>
<td>4.86</td>
<td>8.51</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>4.99</td>
<td>7.79</td>
</tr>
<tr>
<td>Agricultural Sciences</td>
<td>6.18</td>
<td>9.93</td>
</tr>
<tr>
<td>Psychology</td>
<td>3.70</td>
<td>10.87</td>
</tr>
<tr>
<td>mean</td>
<td>5.52</td>
<td>7.58</td>
</tr>
</tbody>
</table>

*Academic salaries were multiplied by 11/9 to convert academic years to industrial working years.

The hypothesis that salary increases are as variable across disciplines in academe as they are in industry is rejected at the .95 confidence level. A test of the hypothesis for salary changes over the 1966-74 period provides similar, but more striking, results.

Institutional Affiliation and Faculty Salaries. Chapter 3 argued that while property rights are attenuated in all public and nonprofit colleges, the degree of attenuation is greatest in public colleges and least in church-related colleges. Consequently, it was predicted that faculty salaries would be higher in public than in private colleges and that, among the latter, salaries would be higher in private-independent colleges than in church-related colleges. This ignores all other factors that affect salaries in academe except institutional affiliation, a qualification of considerable importance when attempting to establish empirical support for the hypothesis.

Table 8 provides information on faculty salaries in public and private colleges for the 1977-78 academic year. It is readily apparent that the ordering of salaries among public, private-independent, and church-related colleges agrees with the predicted ordering only in categories IIA and IIB. In category I, the ordering is different than predicted: private-independent colleges pay the highest salaries and church-related colleges pay the lowest. The apparent contradiction in category I between what is observed and what was predicted is likely to
be the result of a violation of the *ceteris paribus* assumption mentioned in the previous paragraph. Because private-independent colleges are disproportionately represented in rankings of graduate programs,\(^{24}\) it is reasonable to conclude that they are more involved in the prestige-quality "race" than public colleges—and that this involvement, rather than institutional affiliation, leads private independents to pay higher salaries than public colleges.\(^{25}\) It follows, therefore, that to compare the effect of institutional affiliation on the salaries of colleges, one should concentrate only on the salary structure of category IIA and IIB institutions. Prestige and quality are probably given greater attention by private-independent colleges than by public colleges even in these categories, but the difference is perhaps of a smaller magnitude than it is among category I institutions.

\(^{24}\)In category I are 53 private-independent colleges and 146 public colleges, a ratio of approximately 1:3. When rated by quality of graduate faculty, private-independent colleges constitute well over half of the ten or twenty institutions in many disciplines: in economics, the private-public ratio is 1.5:1 (top ten institutions); in philosophy, the ratio is 1.5:1 (top ten institutions); in chemistry, the ratio is 1.75:1 (top eleven institutions). Similar ratios are found for other disciplines as well. See Kenneth D. Roose and Charles J. Anderson, *A Rating of Graduate Programs* (Washington, D.C.: American Council on Education, 1970).

\(^{25}\)It is reasonable to expect that quality, prestige, and publications play less of a role in the determination of salaries for librarians than for faculty. AAUP data for 1975–76 show that college librarians in every category (I, IIA, IIB) earned the most at public institutions and least at church-related institutions. This supports the contention that faculty salaries in category I colleges are affected by the desire for prestige by private-independent colleges. Prestige is discussed in more detail below.
In most instances a proper ordering of salaries is not sufficient support for a hypothesis; statistical tests would have to be performed to show that the ordering is significant. That is not the case here, however. Statistical tests are used when data limitations make it necessary for analysts to compare sample estimates of population parameters rather than the parameters themselves. Because all estimates are subject to error, a difference between estimates may reflect either of two things: sampling error, or an actual difference between parameters of the populations from which samples were drawn. Statistical tests are used to evaluate the probability that differences between parameter estimates are not caused by error—or, conversely, that there are actual differences between population parameters.

Since AAUP surveys include virtually every four-year college in the United States, the salary medians reported by that organization (Table 10) are not subject to sampling error. Accordingly, tests of significance are neither required nor appropriate in evaluating the hypothesis considered here. If one accepts the view that category IIA and IIB salaries are appropriate indicators of the relationship between salaries and institutional affiliation, the figures provided by Table 10 very definitely support the proposition that salaries at public colleges are greater, and salaries at church-related colleges are less, than those at private-independent colleges.

Faculty Salaries and Prestige. The discussion of prestige in academe (Chapter 3) noted that recognition as a "center of knowledge" is
<table>
<thead>
<tr>
<th>Academic Rank</th>
<th>Type of College</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public</td>
<td>Private-Independent</td>
<td>Church-Related</td>
<td></td>
</tr>
<tr>
<td><strong>CATEGORY I</strong></td>
<td>$26,420</td>
<td>$28,880</td>
<td>$24,850</td>
<td></td>
</tr>
<tr>
<td>Professor</td>
<td>$19,780</td>
<td>$20,150</td>
<td>$19,320</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>$16,090</td>
<td>$16,140</td>
<td>$15,920</td>
<td></td>
</tr>
<tr>
<td>Assistant</td>
<td>$12,860</td>
<td>$13,190</td>
<td>$12,640</td>
<td></td>
</tr>
<tr>
<td>Instructor</td>
<td>$20,360</td>
<td>$22,210</td>
<td>$19,060</td>
<td></td>
</tr>
<tr>
<td>All Ranks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CATEGORY IIA</strong></td>
<td>$24,290</td>
<td>$23,380</td>
<td>$19,950</td>
<td></td>
</tr>
<tr>
<td>Professor</td>
<td>$19,280</td>
<td>$18,470</td>
<td>$16,550</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>$15,860</td>
<td>$15,130</td>
<td>$14,040</td>
<td></td>
</tr>
<tr>
<td>Assistant</td>
<td>$12,790</td>
<td>$11,960</td>
<td>$11,160</td>
<td></td>
</tr>
<tr>
<td>Instructor</td>
<td>$18,820</td>
<td>$17,880</td>
<td>$16,030</td>
<td></td>
</tr>
<tr>
<td>All Ranks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE 10 (cont.)

<table>
<thead>
<tr>
<th>Academic Rank</th>
<th>Type of College</th>
<th>Public</th>
<th>Private-Independent</th>
<th>Church-Related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>$22,070</td>
<td>$21,790</td>
<td>$18,560</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>$18,060</td>
<td>$16,650</td>
<td>$15,290</td>
<td></td>
</tr>
<tr>
<td>Assistant</td>
<td>$15,220</td>
<td>$13,830</td>
<td>$12,960</td>
<td></td>
</tr>
<tr>
<td>Instructor</td>
<td>$12,470</td>
<td>$11,360</td>
<td>$10,740</td>
<td></td>
</tr>
<tr>
<td>All Ranks</td>
<td>$16,690</td>
<td>$16,320</td>
<td>$14,530</td>
<td></td>
</tr>
</tbody>
</table>

*Salaries reported on a standard academic year basis.

**CATEGORY I - includes institutions which offer the doctorate degree and which conferred in the most recent three years an annual average of fifteen or more earned doctorates covering a minimum of three nonrelated disciplines.

CATEGORY IIA - includes institutions awarding degrees above the baccalaureate but not included in Category I.

CATEGORY IIB - includes institutions awarding only the baccalaureate or equivalent degree.

closely related to faculty publications. If a college (through its officials) endeavors to become more prestigious, it must hire professors who will author scholarly articles and books. In theory, the desire for prestige by colleges creates a demand for the services of publishing professors over and above the demand for their other services and, when the ability to publish is not universal, creates a differential between the salaries earned by publishing and nonpublishing faculty. If this reasoning is correct, it should be possible to observe a differential between wages paid by colleges which desire prestige and by colleges which do not.

Verification of this hypothesis is difficult. It requires identifying the colleges that desire prestige and the extent to which they desire it—perhaps an impossible task. A practical solution to the problem of identification is to assume (perhaps incorrectly) that the colleges which are prestigious are the colleges which desire prestige, and that the most prestigious colleges are the ones which desire it most. With this assumption, the hypothesis to be tested is that there will be a positive relationship between college prestige and faculty salaries.

One of the best-known measures of prestige in academe is provided by ratings of faculty quality.\textsuperscript{26} It is reasonable to accept this

\textsuperscript{26}Indeed, some claim that such ratings are primarily a measure of prestige. See W. Patrick Dolan, \textit{The Ranking Game} (Lincoln: University of Nebraska Press, 1976).
measure, because faculty quality ratings, like prestige, are highly influenced by faculty publications. Using ratings of faculty quality as a proxy for prestige, then, the expectation is that faculty salaries will be positively related to faculty quality ratings.

Available evidence suggests that this hypothesis cannot be rejected. A study performed by Allan Cartter for the American Council on Education used 1964 data gathered from 95 major colleges, and reports a correlation of .873 between faculty compensation and ratings of graduate faculty. A second test of the hypothesis was conducted by John Muffo using 1969 data; results were very similar to those obtained by Cartter. Ideally, the hypothesis would be tested using more recent observations, but the information required for that test has not been collected.

\[\text{In many analyses the quantity of faculty publications is used to rate faculty quality. An example is provided by J.J. Siegfried and T.A. Zak, "Predicting Graduate Faculty Ratings for the 1970s," Economic Inquiry, Vol. 14, No. 2 (June, 1976), pp. 291-293.}\]

\[\text{In the 1960s the American Council on Education sponsored two surveys on faculty quality and effectiveness of graduate programs. The findings (i.e., the ratings) can be found in Allan M. Cartter, An Assessment of Quality in Graduate Education (Washington, D.C.: American Council on Education, 1966) and K.D. Roose and C.J. Andersen, A Rating of Graduate Programs.}\]

\[\text{Cartter, An Assessment of Quality in Graduate Education, chapter 5. The correlation coefficient was reported as significant by Cartter.}\]


\[\text{Recent data is available for at least one discipline, and it supports the hypothesis advanced here. See George J. Worth, "1978-79 Average Salaries in Nationally Rated Graduate English Departments," ADE Bulletin, No. 61 (May, 1979), pp. 41-42.}\]
Unemployment in the Doctorate Labor Market. It was explained in Chapter 4 that when wages differ between employment sectors it is rational for individuals with low-wage jobs to qualify and search for jobs in the high-wage sector. Since job search often occurs during periods of unemployment and underemployment, the expectation is that both will be observed whenever intersectoral wage differentials arise. Evidence presented above indicates that Ph.D.s in a number of disciplines are paid more by colleges than by profit-seeking firms, so conditions in the doctorate labor market make unemployed job search profitable and, if the theory of rent-seeking unemployment is correct, likely.

Although wage differentials are what make rent-seeking unemployment feasible, a number of other factors also affect the level of unemployment in a discipline. These variables are $i$, the rate at which individuals discount future receipts and expenditures; $n$, the number of years the holders of doctorates have remaining in their careers; $v$, the rate at which jobs in the high-wage sector are vacated; and $k$, the fraction of employment accounted for by the high-wage (academic) sector. The hypothesis, then, is that the rate of Ph.D. unemployment in discipline $j$ is functionally related to these variables. Mathematically,

$$u_A^j = u(w^j, i^j, n^j, v^j, k^j).$$

As noted in the previous chapter, the rate at which individuals discount future receipts and expenditures is unknown. For that reason, and because the rate of discount probably does not differ by much among disciplines, it is omitted from the following analysis. More disturbing
is the lack of data on vacancy rates by discipline. Available evidence suggests that the vacancy rate is approximately eight percent (.08) for all disciplines combined, but without more detailed information it is impossible to estimate the impact this variable has on Ph.D. unemployment. Deleting i and v, then,

$$u^j_A = f(\omega^j, n^j, k^j).$$

To estimate parameters for this equation it is necessary to ignore the distinction between academic disciplines and their related fields of employment. The theory developed in Chapter 4 is strictly applicable only to employment fields, but data limitations make it impossible to adhere to that restriction: Ph.D. unemployment figures are reported by academic discipline, while salary data are available only by field of employment. The problem with predicting unemployment among, say, mathematics Ph.D.s from the intersectoral wage differential in the field of mathematics is apparent if it is recognized that some unemployed mathematicians have the option of working in a field other than mathematics (e.g., computer science or physics). There are two ways to deal with this possibility: include in the model wages paid in related employment fields and an index of skill substitutability between fields, or assume that interfield mobility is so limited as to be inconsequential.

---

Because no index of substitutability is available and because interfield mobility appears to be relatively limited in all disciplines except one, the second approach is taken here. That is, it is assumed that individuals with doctorates in discipline \( m \) are either employed in field \( m \) or unemployed.

Before estimating parameters for any quantitative relationship (including the unemployment equation above), one must select the proper functional form. More specifically, is the relationship between the unemployment rate and independent variables \((w,n,k)\) believed to be linear, multiplicative, exponential, quadratic, or of some other form? The mathematical model developed in the Appendix to Chapter 4 provides the basis for this choice; although multiplicative and exponential elements are included in the unemployment equation derived there, the relationship between the unemployment rate and the various independent variables is, for the most part, linear. For that reason it was decided to estimate parameters for the equation

\[
    u^j_A = a_0 + a_1 k^j + a_2 w^j + a_3 n^j + a_4 w^j n^j + e.
\]

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34. Equation (10) in the appendix to Chapter 4. \( u_A \) and \( k \) are introduced into the model in the text of Chapter 4.
Only the term $w^j n^j$ requires elaboration. Certain terms of the unemployment equation include both $w$ and $n$; $wn$ in the regression equation is intended to allow for an interaction in the effects of these variables on unemployment.

Aside from the possibility that Ph.D. unemployment is not a rent-seeking activity, parameter estimates may indicate that unemployment rates are not related to $w$, $k$, and $n$ as expected for at least two reasons. First, the hypothesized relationship between the unemployment rate and the variables $w$, $k$, $n$, $v$, and $i$ is a complex one that is only partially captured by the simplified regression equation employed here. Approximations nearly always result in some amount of error, and in this case the error is likely to appear in parameter estimates. Second, inadequate salary data for the humanities disciplines reduce the accuracy of estimated values of $w$. Since parameter estimates are intended to provide information (in this case about the underlying relationship between unemployment and a few variables), their validity is diminished by inaccuracies in the data upon which they are based. These two problems suggest that even if the theory of rent-seeking unemployment is correct, it is quite possible that regression analysis will fail to support the theory.

Table 11 provides values of $u_A^*$, $w^*$, $n$, and $k$ by discipline. In calculating $w^*$, faculty nonpecuniary income was assumed to equal $6000, similar regression results are obtained when using the $5200 estimate, however.
Using data found in Table 11, parameters for the equation above were estimated using ordinary least squares regression techniques. The results are summarized in Table 12.

It may be noted that all coefficient estimates (except for the intercept term) are significantly different than zero. The coefficient of \( k \), academic employment as a fraction of total employment, is positive. This means that increases in \( k \), ceteris paribus, are associated with increases in the unemployment rate. This finding supports the prediction made in Chapter 4. Less certain is the sign of the empirical relationship between \( u_A \) and the variables \( \hat{w} \) and \( n \). Both were expected to be positively related to the unemployment rate, but the parameter estimates presented above do not unequivocally support that prediction.

Differentiating the regression equation with respect to \( \hat{w} \),

\[
\frac{3u_A}{3\hat{w}} = -.541 + .0261 n ,
\]

which is positive only when \( n > 20.73 \). When retirement age is 65, this means that \( 3u_A / 3\hat{w} \) is positive for individuals age 43 and under. As expected, then, the theory would seem to be most applicable to individuals who received the Ph.D. in recent years (approximately the last fifteen years).

Further,

\[
\frac{3u_A}{3n} = -.00443 + .0261 \hat{w} ,
\]
### TABLE 11

Values of Selected Variables by Discipline or Field of Employment, 1977

<table>
<thead>
<tr>
<th>Discipline</th>
<th>$u_A$</th>
<th>$w$</th>
<th>$n$</th>
<th>$k$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>.012</td>
<td>.0361</td>
<td>23.3</td>
<td>.778</td>
</tr>
<tr>
<td>Computer Science</td>
<td>.000</td>
<td>.1348</td>
<td>29.5</td>
<td>.343</td>
</tr>
<tr>
<td>Physics</td>
<td>.011</td>
<td>.0268</td>
<td>22.2</td>
<td>.515</td>
</tr>
<tr>
<td>Chemistry</td>
<td>.012</td>
<td>-.0203</td>
<td>20.4</td>
<td>.319</td>
</tr>
<tr>
<td>Earth Science</td>
<td>.010</td>
<td>.0314</td>
<td>21.2</td>
<td>.445</td>
</tr>
<tr>
<td>Engineering</td>
<td>.006</td>
<td>.0836</td>
<td>23.0</td>
<td>.255</td>
</tr>
<tr>
<td>Agricultural Science</td>
<td>.005</td>
<td>.0959</td>
<td>20.0</td>
<td>.506</td>
</tr>
<tr>
<td>Biological Science</td>
<td>.017</td>
<td>.0549</td>
<td>21.2</td>
<td>.665</td>
</tr>
<tr>
<td>Psychology</td>
<td>.013</td>
<td>-.1627</td>
<td>22.1</td>
<td>.438</td>
</tr>
<tr>
<td>History</td>
<td>.029</td>
<td>.3900</td>
<td>19.4</td>
<td>.869</td>
</tr>
<tr>
<td>Art History</td>
<td>.039</td>
<td>.2950</td>
<td>19.9</td>
<td>.883</td>
</tr>
<tr>
<td>Music</td>
<td>.023</td>
<td>.3550</td>
<td>19.5</td>
<td>.858</td>
</tr>
<tr>
<td>Speech</td>
<td>.009</td>
<td>.4000</td>
<td>17.2</td>
<td>.895</td>
</tr>
<tr>
<td>Philosophy</td>
<td>.046</td>
<td>.3000</td>
<td>21.2</td>
<td>.931</td>
</tr>
<tr>
<td>English/Am. Lit.</td>
<td>.033</td>
<td>.3150</td>
<td>19.8</td>
<td>.913</td>
</tr>
<tr>
<td>Modern Languages</td>
<td>.043</td>
<td>.2950</td>
<td>18.8</td>
<td>.916</td>
</tr>
<tr>
<td>mean</td>
<td>.019</td>
<td>.1644</td>
<td>21.2</td>
<td>.658</td>
</tr>
</tbody>
</table>

**SOURCE:** All data from National Research Council, *Science, Engineering, and Humanities Doctorates in the United States: 1977 Profile* (Washington, D.C.: National Research Council, 1978), tables 1.3, 1.5A, 1.9, 1.11, 2.3, 2.5A, 2.9, and 2.11. $n_j = 65$ years minus average age of individuals with the Ph.D. in discipline $j$, where the average age was calculated from midpoints of age intervals given in tables 1.3 and 2.3.


**TABLE 12**

Regression Estimates

Dependent Variable: $u_A$

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficient</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.0840</td>
<td>1.92</td>
</tr>
<tr>
<td>$k$</td>
<td>.0496</td>
<td>3.20</td>
</tr>
<tr>
<td>$w$</td>
<td>-.541</td>
<td>-2.60</td>
</tr>
<tr>
<td>$n$</td>
<td>-.00443</td>
<td>-2.30</td>
</tr>
<tr>
<td>$wn$</td>
<td>.0261</td>
<td>2.59</td>
</tr>
</tbody>
</table>

Degrees of Freedom = 16 - 5 = 11

$R^2$ (adjusted for degrees of freedom) = .657

$F = 8.19$
which is positive when \( w > .17 \). Chapter 4 predicted that rent-seeking unemployment would become feasible when \( w \) exceeds .08 (the approximate value of \( v \), the vacancy rate in academia), but the theory presented there assumed that there are no costs of job search other than foregone wages. Since there are other costs of job search, one would expect that \( w \) will have to exceed .08 by a considerable margin before rent-seeking unemployment will occur. One should note that \( w > .17 \) in all of the humanities disciplines, and perhaps in many of the social science disciplines (for which data are not available).

Because this dissertation is about Ph.D. unemployment, of interest here is the impact a change in \( \dot{w} \) has on the unemployment rate. The impact decreases as age increases (as \( n \) decreases), but by evaluating \( \frac{3u_A}{\dot{w}} \) for a specific age group it is possible to get some idea of the magnitudes involved. Let \( n = 30 \) (age = 35). Then,

\[
\frac{3u_A}{\dot{w}} = -.541 + .0261 \times 30 = .242.
\]

According to this, a one-percent increase in \( \dot{w} \) (from, say, 25% to 26%) is associated with a rise in the unemployment rate of nearly one-fourth of one percent. If the industry wage is $20,000, a $2400 decrease in the academic wage should cause \( u_A \) to fall by approximately 2.9%. Slightly different impact estimates would be found using different values of \( n \), but this figure is close enough to what was expected that it tends to support the theory of rent-seeking unemployment presented in Chapter 4.
Summary

The purpose of this chapter has been to test the empirical validity of theories developed in earlier chapters of this dissertation. In one or two instances test results were somewhat inconclusive, but it is fair to say that actual conditions are broadly consistent with the major hypotheses of this study.
Summary of Earlier Chapters

This dissertation provides an explanation of Ph.D. unemployment. Chapter 2, which described academia and traced its history in America, argued that a combination of events brought about a fundamental change in the nature of academe. Beginning in the late nineteenth century, control of colleges passed from trustees and the parties they represented to administrators and faculty. Since the goals of employees are different from the goals of owners, one would expect the redistribution of power to affect academic policy; policies today reflect to a greater degree the goals of employees than they did previously. Chapter 3 considered that possibility by examining the operation of two types of firms—one operated by owners for the purpose of earning a profit, the other operated by employees for the purpose of producing education. One (rather obvious) conclusion derived from that analysis was that colleges, being run by their employees, will pay employees more than for-profit firms. Another, less obvious and less certain, conclusion was that salaries in colleges are more likely to equalize across disciplines (or fields of employment) than salaries in for-profit firms.

1 The events mentioned here include a growth in government expenditures on higher education, the increased emphasis placed on research activities by faculty, and an expanding list of goals pursued by colleges.
These propositions have considerable relevance to the explanation of doctorate unemployment, as shown in Chapter 4. Building on earlier analyses of minimum-wage laws, it was demonstrated that when a labor market is segmented between high- and low-wage jobs, and if the number of jobs in the high-wage sector is less than the total supply of qualified workers, it is profitable for at least some individuals to refuse employment in the low-wage sector (i.e., to become unemployed) and search for high-wage jobs. Since Chapter 3 described the doctorate labor market as segmented between high-wage jobs (in academe) and low-wage jobs (in industry), a large part of Ph.D. unemployment may simply be job search induced by the compensation policies of colleges.

Implications and Solutions

If the preceding analysis is correct, and the evidence presented in Chapter 5 suggests that it is, it suggests that Ph.D. unemployment in most disciplines could be reduced by lowering faculty salaries. While that is one solution, there are other ways of reducing unemployment also. One method, mentioned earlier, would be to restrict graduate-school enrollments. In time, the supply of qualified manpower would fall by enough to drive the market-clearing wage up to the level paid by colleges, and the Ph.D. surplus would disappear.

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2 Refer to the discussion of fixed-ratio models in Chapter 1.

3 This assumes that colleges would not raise faculty wages by as much as the increase in equilibrium wages.
Some see the idea of reducing unemployment by lowering faculty salaries as inequitable. Lower salaries in colleges would redistribute income from existing faculty to (previously unemployed) new faculty.\textsuperscript{4} To the extent that unemployment is rent-seeking behavior (entered into voluntarily so as to increase lifetime income), however, the redistribution serves only as a subsidy to individuals already engaged in a profitable undertaking—the desirability of which is questionable.

That does not mean that faculty salary decreases should not occur; it means that a desire to reduce PhD unemployment may not be sufficient justification for those decreases. Probably more important than unemployment are the effects high salaries have on the quantity and quality of education produced in this country. One may believe that the current structure of salaries is necessary in academe—that colleges would, in any meaningful sense, cease to function if market criteria were used in setting faculty pay. If that is true, then the present setting may be efficient (or nearly so): changing the wage scale would do more harm than good.

An opposing view is that institutional arrangements in academe allow colleges to operate inefficiently—which may include paying excessive wages to faculty—and pass the cost of inefficiency on to customers (students) and owners (taxpayers and donors). This, of course, summarizes the position taken in Chapter 3. According to this view, it

\textsuperscript{4}This is discussed by Gordon Tullock, "The Transactional Gains Trap," \textit{Bell Journal of Economics}, Vol. 6, No. 2 (Autumn, 1975), pp. 671-678.
is possible to increase the amount of education produced per dollar of expenditure by changing institutional arrangements in a way that would force colleges to operate more efficiently. One result of the institutional change may be for faculty salaries (hence, unemployment) to fall, but it is the increase in efficiency, and not the decline in unemployment, which justifies the reduction in salaries.5

An institutional change widely believed to promote efficiency within colleges was proposed nearly twenty years ago by Milton Friedman.6 He began by recognizing that a large part of the subsidy to higher education is distributed in a way that decreases the willingness of students to search for and attend colleges which produce education most efficiently.7 This reduces the penalty for inefficiency in colleges—a loss of students—and therefore increases the amount of inefficiency which actually occurs. The solution? Rather than direct subsidies to colleges, governments (and donors) could give vouchers to students which could be "spent" at virtually every college.8 This would allow students to attend only those colleges

5If present institutional arrangements are not changed, a reduction in faculty pay need not lower the operating costs of colleges; the waste may simply occur elsewhere (e.g., as increased salaries for administrators.


7Subsidies are granted to colleges on the basis of criteria that are often unrelated to the quality of education (e.g., institutional affiliation). Colleges use subsidies to lower tuitions, and lower tuitions cause enrollments to increase.

8Colleges receiving vouchers from students would "redeem" them with the issuing government (or donor) for a predetermined amount of money.
that offer a high quality education at a low cost, so colleges would have to become more efficient to continue to operate. If before the voucher plan was instituted college faculty were paid in excess of their marginal value in production, faculty salaries would be expected to fall after the plan's introduction.

Other institutional changes could also increase efficiency in colleges. While it is difficult to generalize, those changes would probably promote competition among colleges, either for students or for subsidies.

Less comprehensive proposals to stimulate efficiency have been made. Some suggest, for example, that colleges increase their student: faculty ratios to reduce the salary component of operating expenditures. To the degree faculty salaries are higher than necessary, this may appear to be a reasonable suggestion. However, Chapter 3 argued that the amount of waste (inefficiency) allowed in not-for-profit firms (colleges) is

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9 When setting faculty wages, colleges would presumably include in their calculations whatever gains in production result from maintaining academic equity.

10 If it is true that for-profit firms operate more efficiently than not-for-profit firms, Freeman's voucher plan should result in the establishment of for-profit colleges and in the failure of at least some public and private nonprofit colleges.

11 William Niskanen notes that when government bureaus produce similar outputs and must compete for subsidies (budgets) they become more efficient. See his Bureaucracy and Representative Government (Chicago: Aldine-Atherton, 1971).
determined by the incentive owners and their representatives have to institute policies of cost control. If that is true, then the total amount (but not necessarily the distribution) of waste which actually occurs will not be affected by partial measures which deal only with the results, rather than the design, of inefficient institutions.
BIBLIOGRAPHY


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DOCTORATE UNEMPLOYMENT AS RENT-SEEKING BEHAVIOR

by

Thomas L. Wyrick

(ABSTRACT)

This dissertation provides an economic explanation for Ph.D. unemployment. The discussion begins with a theoretical investigation of policy making in nonprofit colleges. The predictions of this analysis are that colleges will operate less efficiently than for-profit firms; that faculty salaries will exceed market-clearing levels (in most disciplines); and that faculty salaries will tend to equalize across disciplines (while market-clearing salaries will probably vary across disciplines).

The theory of rent-seeking unemployment is then presented. When the academic wage exceeds the nonacademic wage, those gaining faculty positions receive rents; so some individual will refuse nonacademic jobs (accept unemployment) and search for rent-yielding academic jobs. The hypothesis is that unemployment rates will be highest in those disciplines where the intersectoral wage differential is greatest.

Empirical evidence is presented which supports the major hypotheses of this study.