1980

Institutional origin : labor market signaling in higher education

Jean Conover Wyer

College of William & Mary - School of Education

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INSTITUTIONAL ORIGIN: LABOR MARKET SIGNALING IN HIGHER
EDUCATION

The College of William and Mary in Virginia

Ed.D. 1980

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INSTITUTIONAL ORIGIN:
LABOR MARKET SIGNALING IN HIGHER EDUCATION

A Dissertation
Presented to
The Faculty of the School of Education
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

by
Jean Conover Wyer

August, 1980

INSTITUTIONAL ORIGIN:
LABOR MARKET SIGNALING IN HIGHER EDUCATION

by

Jean Conover Wyer

Approved August 1980 by

Dr. Robert B. Bloom, Ph. D.

Dr. Donald J. Herrmann, Ph. D.

Dr. Clifton F. Conrad, Ph.D.
Chairman of the Doctoral
Committee

To
those friends who have given
the greatest gift of all:
They had faith,
when I had none.

JCW

AKNOWLEDGEMENTS

The currently fashionable term, mentor, cannot do justice to the assistance given me by my committee members, Dr. Donald J. Herrmann and Dr. Robert B. Bloom, and especially by my Committee Chairman, Dr. Clifton F. Conrad. I have enjoyed their support and sufferance, as well as their active participation in this research study. For all of the things I have learned from them, gifts far beyond the standard assistance with design and execution, I now thank them.

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Chapter 1

INBREEDING AND THE ACADEMIC LABOR MARKET

Recent attention to the need for the inclusion of minorities and women in the professoriate has fostered renewed interest in the operation of the academic marketplace. Initially, this attention was directed at entry-level faculty selection. However, as larger numbers of minority and female faculty have accrued longer periods of service, the mechanisms and criteria for promotion and tenure decisions have also become a subject of concern. An example of the recognition of the need for research on post-selection decision processes can be found in the lament that "the relationship of affirmative action to tenure has not been tackled by any applicant" in a 1977 report from the Fund for the Improvement of Postsecondary Education (The Fund for the Improvement of Postsecondary Education, 1977, p. 3).

The Problem

In response to the need for further research on promotion and tenure decisions, this study has examined one of the criteria used in these decisions: inbreeding. The relevance of this characteristic, which has been largely ignored in recent studies, was demonstrated by the inclusion of a provision that the University of Minnesota waive its policy of not hiring its graduates for tenured positions in the consent decree settling a recent sex discrimina-

tion suit that attracted national attention (Broad, 1980).

The merits of institutional inbreeding have been a subject of controversy in the higher education literature for sometime. In his University Administration, first published in 1908, Charles W. Eliot assessed the practice:

It is natural, but not wise, for a college or university to recruit its faculties chiefly from its own graduates-- natural, because these graduates are well known to the selecting authorities, since they have been under observation for years; unwise, because breeding in and in has grave dangers for a university [p. 90].

Institutional origin has been used in selection, retention, promotion, and tenure decisions. Caplow and McGee (1958) noted the effects of origin in their classic study, The Academic Marketplace: "Rules about 'inbreeding' and 'outbreeding' also account for a fair number of involuntary terminations, the former being far more common than the latter.... [Inbreeding] is commonly disapproved but widely practiced [p. 41]."

Inbreeding is important in any examination of wage and occupational discrimination because of its major impact on women. It was included in the list of issues compiled by the Association of American College's Project on the Status and Education of Women: "Policies that forbid departments from hiring their own students upon degree completion decrease the available pool of qualified

female applicants and work a particular hardship on married women who may not be mobile [Sandler, 1974, p. 7]." The same concerns were expressed by Gappa and Uehling (1979) in their monograph on women in academe. They lament the

lack of evidence about the effect of inbreeding policies.

Some researchers have suggested that as women typically move where their spouses find employment, they are limited in their choice of institutions at which they can complete graduate work. Rules prohibiting the hiring of an institution's own graduates effectively limit the opportunities for such women for employment [1979, p. 51].

Lack of mobility due to marital or familial constraints is the most often cited reason for inbreeding among women faculty. Despite the rise in dual-career marriages and the emphasis on equality, most location decisions are resolved in favor of the male's job. Wives who follow the standard pattern of supporting their spouse through his graduate work and then pursuing their own advanced work at the institution at which he takes his first job may have little choice about where they can seek employment.

Another reason for inbreeding in women faculty members is affirmative action pressures. An institution attempting to hire nontraditional faculty may find that the easiest applicants to attract are their own graduates. Especially in fields where they

are very rare, the surest way to find a woman or a minority person for a faculty slot may be to recruit a graduate student. To the extent that this is true and that inbreeding is viewed as a negative signal in faculty decisions, affirmative action pressure may contribute to the poorer performance of nontraditionals within the academic community over the long run.

Along with the possibility that it is more likely that women are inbred, differential application of inbreeding prohibitions leads to occupational discrimination. Joan Abramson (1975) discusses this possibility:

There is also some evidence that [the inbreeding] policy is eased more often for men than for women. My own family provides examples of this phenomenon. My husband went from graduate student straight up to associate professor at Stanford. His career was not set back the least by the fear of inbreeding. Indeed, the minute he completed his Ph.D. requirements his rank changed from acting assistant professor to assistant professor. In contrast, my sister was told that UCLA could offer her only a lectureship. Even the lectureship was available only because she was clearly one of the best qualified Ph.D.s in her field for some years. She was told that she was lucky that her department had considered breaking the rules for her and that the lectureship appointment most

likely would not be extended beyond a single year

[p. 6].

Given the bias against inbreeding and given the evidence that women may have greater reason to be inbred, it is important to examine whether inbreeding is a reasonable variable in tenure, promotion, retention, and selection decisions. There are two levels at which the question can be approached. First, one can look at the institutional effects of inbreeding: What are the effects of inbreeding on collegial relations, curriculum, and other institutional characteristics? Abramson noted the following:

Many universities refuse to employ their own graduates in anything but temporary positions on the assumption that . . . inbred departments become stagnant and void of the new ideas brought in by cross-fertilization from other universities. The theory is in itself less than sound, for it assumes that graduates are permanently fixed in their thinking by their training [1975, p. 6].

The institutional effects of inbreeding pose some interesting research problems, but they are beyond the scope of this study.

The other approach to examining the impact of institutional origin is at the level of the individual faculty member. In the context of the uncertainty about the treatment of minorities and women, this approach leads to the question of whether the policies regarding inbreeding lead to discrimination. Consideration of this

question requires an understanding of the conditions in the academic marketplace and an understanding of the theoretical bases for the determination of discrimination. For the purposes of this study, an economic theory of discrimination provides the theoretical framework. Following some background information on the academic labor market, the remainder of the chapter discusses this theory of discrimination and, within that framework, examines inbreeding as a job market signal which may lead to discrimination.

The Dilemma in the Academic Labor Market

A major theme in recent research on and popular discussion of faculty concerns is the constriction of the academic labor market. Projections of the overall demand for doctoral faculty show strongly decreasing trends between 1980 and 1995 (Cartter, 1976; Fernandez, 1978). Projections of new doctorate hires reflect the same trend. Fernandez's baseline projection (assuming a constant student-faculty ratio) shows a downward trend from 10,500 new hires in 1980 to only 1,000 new hires in 1995. Although this projection is not a monotonically decreasing curve, it does show a precipitous decline in new faculty hiring over the next 15 years. Cartter (1976) combines projections of doctoral completions and junior faculty openings to develop a 5-year discounted estimate of the excess or shortage of doctoral job seekers. This estimate of faculty openings show the same pattern as Fernandez's projection. Cartter predicts 16,100 junior faculty openings for 1980 and 2,200 for 1990, the last year

in the projected series. Through the same period, his 5-year discounted excess of doctorate holders rises from 72,700 in 1980 to a peak of 122,200 in 1986. By 1990, the surplus is projected to have declined to 91,500. Although the Fernandez data for the post-1955 period shows increasing demand it is clear that the academic market for new hires and junior faculty will not be robust in the next 15 years.

At the same time that the total demand and the new doctorate hires are rapidly declining, the fraction of faculty holding tenure is rising. Although the new faculty openings in the 1980s will be few, many people hired in more affluent times will come up for promotion and tenure decisions during that period. The decreasing importance of new appointments is shown in Cartter's analysis of the market for junior faculty which projects only 1,200 openings in 1984. The same model projected 17,300 hires for 1979 (Cartter, 1976, p. 143). In 1984, when there is little discretion in the management of faculty through openings in the junior ranks, there will be a much greater opportunity for decision making at the later career stages. Facing a severely depressed market for new faculty hires, it is clear that the critical decisions concerning faculty in the 1980s and 1990s will be in retention, promotion, and tenure.

At the same time, another significant theme in much of the literature on the professoriate is the need for a broader range of

participation. Traditionally, the faculty in postsecondary institutions have been exclusively or predominantly white and male. Exceptions to this demographic trend are few. Some specialties hold "pink-collar" status (for example, nursing and home economics) but in most departments where a significant proportion of the students is female, the faculty is predominantly male (for example, elementary or secondary education, English or Art). Predominantly black institutions offer an exception to the white and male rule. However, the overall impact of these exceptions is slight and there is a demonstrated need to incorporate nontraditional faculty (women and minorities) into the mainstream of higher education (Carnegie, 1973; Newman, Note 3, p. 3).

The difficulty of increasing the number of nontraditional faculty was observed by Newman:

It has proven far easier to help James Meredith past the governor and into the University of Mississippi than it has to increase the number of black faculty. It has proven easier to increase the number of women attending schools of business than the number of women deans of schools of business [Note 3, pp. 1-2].

This research will emphasize women as a subset of nontraditional faculty. But while specific structural questions to be examined are particularly relevant to women, the general discussion of discrimination applies both to women and minorities.

The real gains in faculty status for women have not been large. Bernice Sandler (Note 4, p. 2) has compiled a "Small list of horrors":

Although there has been an increase in the number of women at the assistant professor level, these gains are not matched by gains in promotions; there has been no comparable gain in tenured ranks.

In 1977-78, the modal rank for men was full professor. For women the modal rank was assistant professor.

In 1973, the salary gap between academic men and women was 16.7%.

In 1977, it was up to 20.5% and still widening.

There are several indications that a far greater percentage of women than men are hired for non-ladder positions rather than those leading to tenure.

Women are still promoted more slowly than men.

The unemployment rate for women Ph.D.'s in the sciences and social sciences is 2-4 times that of men. Sandler goes on to summarize her findings, including the observation that "the higher the rank, the fewer the women" (Note 4, p. 2).

As the Newman (Note 3) and Sandler (Note 4) quotations imply, nontraditional faculty have a "pipeline" problem. Tenured, full professor status cannot be achieved overnight, nor can it be in-

herited or won by lottery. A necessary, but not sufficient, ingredient in the transformation of an assistant to a full professor is time. To increase nontraditional participation in higher faculty ranks, women and minorities must not only be recruited but also retained, promoted, and tenured.

The goal of increasing the participation of nontraditional faculty and the reality of decreasing total demand for faculty are often in conflict (Linnell, Note 3). Sandler (Note 4, p. 2) notes the impact of this situation on women:

With the financial crisis in higher education and the subsequent cutbacks in some faculties, many women have also lost positions, for being less likely to have tenure, they have been the first to be terminated.

Given the dismal, near-term predictions for demand for faculty, it is all too possible that those terminated may not be able to find employment in academia. Indeed, the newly-opened door may be a revolving one.

The only way to fairly increase nontraditional participation in higher ranks, and during times of cutbacks to retain their fair representation, is to ensure that retention, promotion, and tenure decisions are free from any type of discrimination. An exploration of possible discrimination in these decisions requires the selection of a theory of discrimination.

An Economic Theory of Discrimination

In the examination of equity in a beleaguered marketplace, a sufficient theory of discrimination will provide a basis for identifying existing patterns of discrimination and for determining whether the pressures of constricting demand are contributing to the perpetuation of the discrimination. Several disciplines have made significant contributions to the understanding of the discriminatory process. As the most complete, comprehensive, and relevant theoretical base is found in labor economics, it will be used in this study.

Modern labor theory is based on the neoclassical marginal productivity theory of wages augmented by assumptions about the activity in the marketplace. Discrimination, or as it was formerly termed, exploitation, is usually defined as "the payment to labor of a wage less than its marginal revenue product (Cartter, 1959, p. 65)". This definition states that wages should be a function of productivity and net increases in revenue. Since the marginal revenue per unit is constant regardless of the identity of the worker who produced the unit, the definition reduces to equation (1) when viewing the wage differentials between laborers producing identical goods.

$$w_i = f(p_i) \quad (1)$$

where w_i = wages of worker i

p_i = productivity level of worker i

The demand for labor, as the demand for any productive resource, is a function of the marginal revenue product of the worker and the wage rate. Assuming a homogeneous marginal wage rate and a homogeneous product, the quantity of labor employed is also a function of productivity:

$$Q_L = g(p_L) \quad (2)$$

where Q_L = the quantity of labor employed

p_L = the productivity of labor.

Given the two fundamental relationships cited in equations (1) and (2), discrimination can be defined as the violation of one or both of the relations to the detriment of one segment of the labor force. Madden (1973) provides a detailed analysis of these discriminatory acts and includes an additional category in her book on The Economics of Sex Discrimination. She cites three types of discrimination:

1. Wage discrimination, which occurs when wage differentials are not based on relative productivity differences;
2. Occupational discrimination, which occurs when criteria other than productivity determine the quantity of a factor employed in a given occupation;
3. Cumulative discrimination, which occurs when a factor has a lower level of productivity due to past discrimination [p. 2].

The neoclassical definition of discrimination, violation of the

relationship cited in equation (1), corresponds to Madden's first category, wage discrimination. Her second category is the equivalent of the violation of the accepted definition of demand for productive resources shown in equation (2). There is not a theoretical equivalent of cumulative discrimination although labor economists have recently addressed the problem in terms of participation in and barriers to entry into the marketplace.

The identification of wage and occupational discrimination is important to this research. An extension of labor theory describing the market mechanism which matches productivity with employment opportunities and wages is needed to more fully understand the potential for discrimination.

There are three types of economic theories of discrimination. The types are based on the subject used to explain apparent imperfections in the marketplace: information, taste, and power (Addison Siebert, 1979, p. 202). The information-based approach is most relevant for this study of the academic marketplace.

The consideration of the role of information in the labor market has been refined through the analysis of job market signaling. Because employers cannot directly observe future productivity, they must use surrogates in the employment decision-making process. When prospective employees exhibit job-related characteristics, they are said to be signaling employers about their future productivity. Spence (1973) has developed a model of information feedback

in the job market.

Insert Figure 1 about here

In his model, prospective employees provide information (signals) about themselves. Employers translate these signals into expectations about the applicants' marginal productivity through the use of conditional probabilistic beliefs about the relationship between signaling patterns and future productivity. The employer offers a wage based on the expected productivity. Applicants choose which signals to send based on a desire to maximize the excess of the achieved wage rate over the cost of signaling.

Because of the feedback effect embedded in the iterative process, employers should receive frequent information on the validity of their beliefs about the relationship between a given signal and productivity. Spence notes that "the system will be stationary if the employer starts out with conditional probabilistic beliefs that after one round are not disconfirmed by the incoming data they generate [1973, p. 360].

It is the efficiency of this adjustment mechanism which is critical to the long-run abolition of discrimination in the marketplace. To the extent that incorrect employer beliefs about the relationship between signals and productivity are not corrected by experience, invalid beliefs can perpetuate wage and occupational

FIGURE 1: INFORMATIONAL FEEDBACK IN THE JOB MARKET
SOURCE: SPENCE (1973, P. 359)

discrimination. Several authors have questioned the efficiency of this mechanism. Addison and Siebert (1979) note the need for updating information:

Because information about . . . changes is costly to obtain, the process of updating will never be complete. Consequently, it is quite likely that the empirical rules developed will be outdated and that incorrect or biased decisions will tend on average to be made. This tendency will be exaggerated during periods of rapid change [p. 208].

The inability of the feedback mechanism to adjust for rapid changes in the signal-productivity relationship is exacerbated when the change relates to an embedded group. The latter is an identifiable group of workers which is not separated from and assumed to be homogeneous with another group. In this case, the change in the signal-productivity relationship for the embedded group will be masked by the constant function relating to the other, and probably dominant, group. To the extent that the employers' conditional probability distributions are not corrected to reflect the reality of the embedded group, discrimination will occur in a form, which, given the usually naive "equal treatment" interpretations of the term, will be extremely difficult to identify.

Spence's (1973) model utilizes two levels of productivity and demonstrates that job-seekers in the low productivity group will

utilize a signal that represents low productivity and that job-seekers in the high-productivity group still utilize a signal that represents high productivity. Membership in a particular group does not influence signaling behavior. This result relies on several assumptions. One is critical to this study. Spence assumes that the incidence of signaling costs is the same for all groups. This study examines a case in which signaling costs are different for each of two groups. Therefore, the results of Spence's work relating productivity with signaling behavior do not apply.

Assume there are two groups (one and two), and the signaling costs are unequal so that the cost of signaling high productivity for group one always exceeds that of group two. If workers choose signals to maximize the achieved wage rate net of the costs of signaling, highly productive members of group one will signal low productivity as long as the difference between the wages for high producers and low producers does not exceed the incremental signaling costs. It will only be worthwhile for a highly productive group one job-seeker to signal high productivity if the wage differential to be gained exceeds the cost of signaling. Under these conditions, the labor market may effectively discriminate against group one members if it maintains a signal-productivity relationship that speciously assumes equal signaling costs. Occupational and wage discrimination can only be avoided if the market recognizes

the true relationship between group one signaling patterns and productivity. This result differs from Spence's (1973) in that it assumes that the impact of group membership is felt through differing signaling costs rather than through the signaling market mechanism.

Institutional Origin as a Job Market Signal

The impact of institutional origin as a job market signal in faculty personnel decisions depends on the employing institution's expectations about the relationship between inbreeding and productivity. The prevalence of prohibitions against the retention, promotion, and tenure of inbred individuals reflects the pattern of expectations described in equations (3), (4), and (5).

$$E(p_i | y_1) = p_0 \quad (3)$$

$$E(p_i | y_0) = p_1 \text{ with a probability of } q_1 \quad (4)$$

$$E(p_i | y_0) = p_0 \text{ with a probability of } 1-q_1 \quad (5)$$

where y_1 = inbred signal

y_0 = noninbred signal

p_0 = low productivity

p_1 = high productivity

If an applicant is inbred, the employer assumes lower productivity. Of the noninbred group, employers will assume some proportion (q_1) will have high productivity and the rest will not. Spence's (1973) analysis would dictate that no high producer would choose to send the inbred signal. However, when the complication of differential signaling costs is introduced, it is clear that a high producer will signal inbred as long as the costs of signaling noninbred exceed the incremental wage to be gained. Spence notes that the "signaling costs are to be interpreted broadly to include psychic and other costs, as well as the direct monetary ones [1973, p. 359]." The constraints on women's location decisions cited previously act to increase the cost of signaling outbred. Given this assumption, the decision rule cited in equation (3) will discriminate against women.

The purpose of this study is to examine the relationship of inbreeding to productivity and institutional rewards and to determine how that relationship varies between men and women. The results will provide data for evaluating whether inbreeding prohibitions constitute occupational and wage discrimination against women.

Research Hypotheses

The primary goal of the research is to examine the relationship of sex and institutional origin to productivity. Stated more formally, this becomes the following hypothesis which will guide

this study: Female inbred faculty have patterns of productivity which are significantly different from the patterns of productivity of male inbred faculty.

The data base and methodology will also allow a reexamination and extension of the existing work on the relationships between inbreeding and professional and economic advancement. There are two additional research hypotheses which reflect these relationships:

inbred faculty show less professional advancement than outbred faculty;

inbred faculty receive fewer institutional rewards than outbred faculty.

The balance of this dissertation describes the research undertaken: the pertinent literature will be reviewed in Chapter 2; the methodology discussed in Chapter 3; the results presented in Chapter 4; and the study summarized in Chapter 5.

Chapter 2

THE LITERATURE

An examination of the literature relevant to the research hypotheses cited in Chapter 1 should include surveys of the work on inbreeding, productivity, and rewards. In the first section of this chapter, the scope and results of previous studies on inbreeding will be examined. The second section reviews the operationalization of productivity in faculty research, with the emphasis placed on ways of measuring this concept. Because this research is focused on the relation of productivity to inbreeding, no review is made of the literature which describes the relation between productivity and other variables. In the last section, the literature on both reward measures and on methodological approaches for determining wage discrimination is reviewed.

Inbreeding

In an examination of the literature on inbreeding, several aspects of the studies are of particular importance. First, definitions of the phenomenon itself are often problematic. Should faculty with any degree from their employing institutions be considered inbred or should this category be limited to those who work at the institution which granted their terminal degree? Does it matter if an individual has worked at institutions other than his or her alma mater?

Earlier studies use very general criteria for identifying inbred faculty (i.e., any degree from the institution at which the individual is teaching is sufficient for inbred classification). Later studies usually deal with more sophisticated concepts such as "silver cording" (Hargens & Farr, 1973) which refers to faculty members who have taught for some time at institutions other than the ones from which they graduated and then returned to their alma mater. The implication of this phenomenon is that the continuing connection between the home institution and its graduate is sufficiently strong and positive to draw the faculty member back after a "seasoning" period elsewhere. More recent studies reflect the increasing importance of terminal degrees as a qualification for faculty positions by emphasizing doctoral training in the identification of inbred subjects.

A second important aspect of inbreeding studies is their explicit or implied assumptions about the reasons why institutions disfavor, favor, practice, or avoid inbreeding. To the extent that these assumptions do not reflect reality or that an institution's practices do not match its philosophy, there is a clear need to question the difference as it may lead to unfair discrimination against some faculty members.

The description of the effects of inbreeding on the individual and the institution is a third important aspect. A policy on inbreeding which is fair both to the institution and the individuals

involved can only be the result of an understanding of the real effects of the phenomenon. To evaluate the fairness of an institutional policy or practice requires a knowledge of both the relationship between inbreeding and productivity and the stability of that relationship across various groups of faculty and through time.

From Eliot's assessment in his 1908 University Administration, academic inbreeding has received intermittent treatment in the literature on higher education. Many early studies were limited in scope to a single institution or a small sample of institutions. For example, F. W. Reeves examined inbreeding in his study of faculty at the University of Chicago in 1933 and J. H. McNeely studied faculty inbreeding in land-grant colleges and universities (United States Office of Education [USOE], 1932).

In the early 1930s, Walter Crosby Eells and Austin Carl Cleveland (1935a, 1935b) undertook a study of the extent, types, trends, and effects of inbreeding in a national sample of American colleges and universities. Their sample included "all the institutions of higher education on the accredited list of the American Council on Education whose catalogues were available in the library of Stanford University in 1932 and which contained the necessary academic biographies of faculty members [1935a, p. 261]." The sample included 219 institutions in 42 states.

Eells and Cleveland (1935a) adopted a comprehensive definition of inbreeding:

An individual is considered inbred who is a teaching member of the faculty and who has received one or more of his earned degrees from the institution in which he is giving instruction [p. 262].

The use of any degree as a basis for the inbreeding classification expanded the inbred group beyond that usually considered in more recent studies, so that Eells and Cleveland's (1935a) overall results are not directly comparable to later findings. It is possible, however, to use data they present on the patterns of inbreeding according to degree (p. 267) to derive an estimate of terminal degree inbreeding by aggregating all categories which include doctoral inbreeding. The results of this recomputation are shown in Table 1.

Insert Table 1 about here

As Eells and Cleveland (1935a) included instructors in their sample, those still working on their degree were included. No distinction was made between tenure-track and temporary positions: 16.1% of the total sample was inbred at the doctoral level. Not only is this figure comparable to later results, it is also useful in assessing the extent of inbreeding. As Eells and Cleveland noted, the total impact of inbreeding was important: "While many individual cases may be entirely justifiable, in the long run the

Table 1
 Recomputation of Percentage of Inbred Faculty
 on Eells and Cleveland Data

Patterns of Inbreeding	Total n=3903 (%)	Public n=1819 (%)	Private n=2084 (%)
Bachelor--Master inbreeding-- Doctorate inbreeding	4.1	2.4	5.6
Bachelor inbreeding--Master inbred--Doctorate inbreeding	3.8	3.2	4.4
Bachelor--Master--Doctorate inbreeding	3.7	1.8	5.3
Bachelor--No Master--Doctorate inbreeding	2.3	.5	3.9
Bachelor inbreeding--No Master-- Doctorate inbreeding	1.4	.2	2.5
No Bachelor--No Master--Doctorate inbreeding	.4	.1	.6
Bachelor inbreeding--Master-- Doctorate inbreeding	.2	.1	.3
No Bachelor--Master--Doctorate inbreeding	.1		.1
No Bachelor--Master--Doctorate inbreeding*	.1		.1
TOTAL	16.1	8.3	22.8

*From the format of the original table it appears that this line should read "No Bachelor--Master inbreeding--Doctorate inbreeding," and thus it is not a duplicate of the line above.

effect of such inbreeding is likely to be distinctly narrowing [p. 266]." The authors were justifiably concerned about the effects of inbreeding as their analysis using the "any degree" definition showed that 34% of the total sample was inbred.

On the topic of why institutions practice inbreeding, Eells and Cleveland (1935a) offered a precursor of later work. "Institutions also are inclined to utilize their own graduates in the lower academic ranks, in some cases, as a measure of economy [p. 265]." On the individual's side, the authors observed that graduates may seek employment at their own institutions while searching for employment elsewhere or while working on their doctorates.

In their second article, Eells and Cleveland (1935b) examined the effect of inbreeding on rate of advancement, scholarly productivity, and professional recognition. Each of the 5,707 inbred subjects in the study was matched with a noninbred faculty member. The matching was based on several characteristics: institutional membership, length of service, discipline, sex, and rank. With respect to rate of advancement, Eells and Cleveland found that the mean years for advancement to the next higher rank was greater for inbred groups hired at the instructor (4.3 years vice 3.2 years for noninbreds) and assistant professor (4.9 years vice 4.5 years for noninbreds) levels. For those hired as associate professors, the mean years in rank were virtually the same (4.9 for inbred and 5.0 for noninbred). It should be noted that Eells and Cleveland do not

segregate instructors hired while still completing degree requirements. Thus, it is possible that the large discrepancy in mean time to promotion from the instructor level is determined at least in part by the tendency to hire an institution's own students before they receive their degrees.

Eells and Cleveland (1935b) measured scholarly productivity by the number of books published and by the total number of publications. Data was obtained for a paired sample by searching the United States Catalogue. Of the inbred group, 15.8% had published at least one book while 21% of the noninbred group were authors. While 322 inbred authors produced 864 books (2.68 books per author), 428 noninbred authors write 1,122 (2.64 books per author). Based on the lower percentage of inbred authors and the fewer total books produced by them, Eells and Cleveland concluded that there "is a distinct evidence in favor of the noninbred group [p. 326]." They do not seem to consider that on the average, noninbred authors were no more productive than inbred ones and that the option to publish may or may not have been equally available across the whole sample. For example, inbreds hired as instructors who have not finished their degree, are unlikely to publish while noninbreds hired with terminal degrees may be more likely to publish. Although Eells and Cleveland believed this evidence favored noninbreds, it may in fact only have reflected the conditions under which they were hired.

To assess a broader measure of scholarly productivity, Eells

and Cleveland (1935b) studied all publications for 992 subjects at 4 institutions. Data collected from "official reports of faculty publications" revealed that 227 inbred authors produced an average of 6.03 titles per author and 231 noninbred authors produced 6.72 titles per author. Although Eells and Cleveland concluded that these results "are unfavorable to the inbred group [p. 327]," the significance of the difference is questionable, especially in light of the fact that "less than half of the faculty in either group published anything during the three-year period under consideration [p. 328]."

As a measure of professional recognition, Eells and Cleveland (1935b) used the percentage of inbred and noninbred subjects which were included in each of three national reference works. The data for Who's Who in America was characteristic of that for all three works: 7.1% of the inbred subjects were included, while 10.5% of the noninbreds were included. Across all three works, the noninbred subjects were more likely to be mentioned.

Eells and Cleveland (1935b) reviewed the work in their two articles with a clear condemnation of the effects on individuals of institutional inbreeding.

From every standpoint from which objective evidence has been collected it appears that the probability of academic advancement, scholarly productivity, and outside professional recognition are distinctly greater for men who

have had their academic preparation in institutions other than those in which they are teaching [p. 328].

In 1938, A. B. Hollingshead published an article on the relation between ingroup membership and academic selection at Indiana University. One of his three criteria for ingroup membership was "academic training leading to the successful completion of one or more degrees at Indiana University [p.826]." Hollingshead studied 802 regular appointments made from 1885 to 1937. He found such a "prevalence of alumni in administrative office" that he concluded "that the destiny of the university . . . had been centered in the hands of alumni [p. 827]." Other results were the identification of an inverse relation between academic rank and alumni appointments and the discovery that more than one half of the instructors were inbred. Hollingshead cited three reasons for the high rate of selection from within:

First, the administrators were usually egocentric, prizing their own viewpoints above all others; second, they are personally familiar with the [inbred] men and know whether they are "sympathetic" and "reasonable"; third, it is easier to engage a person who is on the ground or readily contacted than to spend time, money, and energy looking for outside personnel. Pride in your institution, familiarity with the men you have trained, and their more general docility, are apparently

some of the factors that tend to "Inbreeding
[p. 832]."

McGee (1960) argued that inbreeding, although "deplored," was practical as a "functional necessity" to allow an institution to compete in the national labor market even though "it is handicapped by location and inadequate finances [p. 483]." In order to attract well-known scholars to a relatively isolated location, the institution must pay them a premium. Given this burden on the finite operating budget, however, the university must find other faculty willing to work at a discount. McGee argued that it is the inbred faculty who were "robbed" in order to attract graduates from other major universities. By discriminating against the inbred faculty on those variables over which the university has control, the efforts of and rewards to inbred faculty were manipulated to allow a surplus of rewards and a decrease in work load for noninbred faculty.

Using the faculty of the University of Texas as a single case study, McGee (1960) examined 9 job factors across inbred and non-inbred faculty. He defined inbred faculty as those which received their highest degree from the University of Texas. Of the 9 job factors, 4 were classified as "Category I: Totally Controlled by the University": present rank, rank at first appointment, years served in junior rank, and annual class load. Professional productivity and possession of research grants were included in

"Category II: Partially Controlled by University." The last three job factors: membership in learned societies, office in learned societies, and listing in national reference works, comprised the third category, "Not Controlled by University." McGee compared the inbred and noninbred groups by defining two levels of performance for each job factor (e.g., "1-6" and "7 and over" for annual class load) and by determining the percentage of inbreds and noninbreds which fit each of the levels. The percentages were then compared by a Chi-square test.

In Category I, all the observed differences were statistically significant at the .05 (or higher) level. As McGee (1960) observed, an inbred faculty member

is less likely to be an assistant professor at the present time, is much less likely to have received his first appointment at that rank even if he now holds it, is more likely to serve longer in the junior ranks before promotion or departure and is more likely to have a higher teaching load [p. 486].

Noninbred faculty were more likely to be classed as productive ($p \leq .05$), where productivity was defined as "any publication or presentation directed to a professional audience, and including pieces of individual creativity in the graphic arts as well as literary, musical, and dramatic works [p. 487]." Of the inbred faculty, 53% were classed as productive while 70% of the noninbred

faculty had achieved the same status. The other partially controlled variable, possession of research grants, required some modification. In a later reference to this article, McGee (1961) admitted that the data was "flatly incorrect in the original table [p. 58]." It is possible to reconstruct what should have appeared in the original table from the data presented in different form in the second article. The corrected results for possession of research grants are shown in Table 2. The analysis of McGee's corrected data presented in this table shows that inbred faculty

Insert Table 2 about here

were significantly less likely to have received grant support.

Results for 2 of the 3 "Not Controlled by University" variables, membership in learned societies and listing in national reference works, were not statistically significant at the .05 level. Only the "office in learned societies" variable showed significant results. Inbred faculty were more likely to have held an office ($p \leq .01$).

McGee (1960) also presented data on production of books, articles, reviews and other publications by University of Texas graduates, graduates of other major institutions, and graduates of minor institutions. Here again the data was presented as percentages of the inbred or outbred groups which have published at

Table 2
Reconstruction of McGee's (1961) Results
on Possession of Research Grants

	Source of highest academic		
	degree		
	Texas	Other	Chi
		Institution	Square
Possession of research grants			
Grants	38	153	
No grants	66	90	
TOTAL	104	243	
			20.55
			<u>p</u> < .01

Note. From "Texas Institutional Inbreeding Re-examined" by
Reece McGee, American Journal of Sociology, 1961, 67, 58-60.

least one item in the category in question. McGee concluded that his data showed that in every case but that of reviews, University of Texas Ph.D.s had produced more scholarly works than men with doctoral degrees from other institutions (p. 488). Actually, the data he presented does not support the contention about the aggregate number of scholarly works, however, it did indicate that for every category except the review, inbred faculty were more likely to have published at least one example.

McGee's (1960) hypothesis was that "the University of Texas, in order to compete to the maximum possible degree in the academic labor market of the other major universities, has appointed large numbers of its own graduates to the junior faculty [p. 486]." He believed that his results showed that there was discrimination against inbred faculty and that "there was no reason to believe that the differential treatment of the inbred product is the result of inferior quality on his part [p. 488]." However, he also thought that the results were not the result of a conscious plan.

All this is not to suggest that the administrators of the university have together compounded a policy for inbreeding; rather it seems more likely that the university's handicaps in the academic labor market have caused numerous deans and department chairmen and members of promotion committees individually to decide to rob Peter to pay Paul in specific cases and have created,

thus, an unconsciously developed administrative adjustment resulting in selective, discriminatory inbreeding [p. 488].

Gold and Lieberman (1961) use the analysis in McGee's (1960) study to demonstrate the need for multivariate analysis "when the investigator is interested in describing a phenomenon of some complexity, not observed directly but inferred from the observation of associations taken to be consequences of the phenomenon [p. 506]." As an example, the authors cite the analysis of rank:

McGee observes directly that a greater proportion of noninbred than of inbred junior members of the faculty are assistant professors. This association between source of highest degree (major academic training) and rank exists at the University of Texas; the observed association cannot be questioned as a description . . . [But] the inference of discrimination must imply that other variables cannot explain or change the nature of the association [p. 507].

By enlarging McGee's (1960) analysis of rank to include possession of a doctorate, Gold and Lieberman deduced that the proportion of non-Ph.D.s was considerably larger among the inbred assistant professors. They concluded that "the data clearly suggests a bias in favor of local products [p. 508]."

Gold and Lieberman (1961) also combined productivity, posses-

sion of a doctorate, rank, and source of degree in a secondary analysis which showed that "33% of the Texans (those with Ph.D.s from Texas) with some claim to higher rank must be instructors [p. 508]," while 37% of the non-Texans fell in the same category. The proportions of both groups which did not meet one or both of the criteria, but had been promoted to assistant professor are virtually the same (23% for Texans, 24% for non-Texans).

Gold and Lieberman's (1961) secondary analysis did cast uncertainty on the original conclusions, but McGee (1960) replied with a further analysis of the original data which added degree to source of highest degree and job factor. Of the variables controlled by the university, inbred faculty were favored only among Ph.D. holders with respect to present rank. Inbred and outbred, non-Ph.D. faculty had the same class loads. For all other job factor and degree combinations, the outsiders were favored. Again, all the statistics were in percentages and no tests of significance were made. On 8 of the remaining 10 job factor-degree combinations, Texans were more productive. Outsiders had a higher percentage of productive people only in professional productivity by non-Ph.D. holders. McGee concluded that "even when the doctorate is considered, the inbred are still discriminated against despite some evidence ~~that~~ they may be of higher quality than 'outsiders' [p. 58]."

The final conclusions to be drawn from the primary and secon-

dary analyses of the McGee (1960) data are not clear. Gold and Lieberman (1961) were correct in their statement that the analysis must take into account significant competing hypotheses and variables, yet McGee's findings are suggestive. It is also important to note that all of the work was based on arbitrary determinations of categories for each variable. None of the analyses used a continuous scale for professional activity, productivity, class load, or offices in learned societies. All of the analyses were dependent on the arbitrary cutoff points chosen to dichotomize variables which would be better treated as continuous scales. Because the data was from only one university, which McGee admits is different in significant ways from other major universities, the external validity of any results must be seriously questioned.

Hargens and Farr (1973) used data collected by Warren O. Hagstrom in 1966 to examine inbreeding. Educational, occupational, and citation histories were collected for 1,514 graduate faculty members in the fields of mathematics, experimental biology, physics, and chemistry. Hargens and Farr examined two questions:

First . . . the relationships between academic inbreeding and measures of scholarly performance after controlling for other variables such as the prestige of a scientist's present departmental affiliation. Second . . . the independent relationship between academic inbreeding and a measure of institutional reward, the number of years

which elapsed between a scientist's appointment to his first position and his first subsequent promotion [p. 1387]. Although Hargens and Farr found a negative relationship between inbreeding and both number of articles published and number of citations to previously published works, the coefficients were not large enough to be significant. The authors concluded that there is "no evidence . . . to suggest that academic inbreeding has any particular independent relationship with scientific productivity when departmental prestige and year of Ph.D. are included in the analysis [p. 1389]."

Hargens and Farr (1973) continued their analysis by examining the effect of inbreeding on quantity of publications and citations for scientists in their first position at "distinguished" departments and for scientists in their second and succeeding appointments across all institutions and for distinguished departments only. Hargens and Farr concluded that

When we control for professional experience, scientists with positions at their doctoral departments tend to be slightly less productive, in terms of quantity and quality of publications, than their noninbred colleagues. Although these differences are fairly small and most often statistically insignificant, it is notable that every one of the 12 regression coefficients indicating a comparison of inbreed with non-inbred scientists shows a negative sign.

On the basis of this evidence it is not unreasonable to suggest that a slight negative relationship between inbreeding and professional output does exist, but that the relationship, independent of other variables, is so small that in a given instance only very large samples enable us to reject the null hypothesis that its manifestation in that instance is attributable to sampling error [p. 1393].

Most existing studies of inbreeding suffer from one or both of two significant weaknesses. Many studies have sampling restrictions based on institution or discipline with a consequent constriction of generalizability. There is also, as Gold and Lieberman (1961) noted, a need for the use of multivariate analyses to limit the number of untested competing hypotheses. The examination of inbreeding as a basis for discrimination must use a data base of sufficient size and diversity to allow generalization and the most sophisticated techniques of analysis the data will support.

In summary, the research on inbreeding is unified only in its assumption of the undesirability of the phenomenon. The pessimism reflected in Eliot's (1908) statement at the turn of the century prevades the literature. Although there are some indications in the research that inbreeding is related to lower productivity, the range of results and the methodological problems which haunt studies in this area hinder the development of a strong conclusion. With respect to the research hypotheses stated in Chapter 1, it is

important to note that none of the research reviewed in this chapter includes any consideration of sex. As it is likely that the samples studied were primarily or completely male, there is no basis for inference about the characteristics of female inbred faculty at colleges and universities.

Productivity

Research Productivity

To evaluate the degree of similarity between two groups or the possible existence of discrimination between the groups, the researcher must be able to describe the members of the groups in terms of characteristics which are relevant to the research question. Much of the research using descriptions of the professoriate has been done by sociologists and economists. The former often work on the sociology of science or information dissemination (e.g., Cole & Cole, 1967; Crane, 1970; Long, 1978) and the latter most frequently examine the reward structure in academia (e.g., Hoffman, 1976; Reagan, 1975).

As the studies of inbreeding demonstrate, an important factor in any economic analysis is productivity. Statements about the fairness of selection procedures and rewards must be tempered by an acknowledgement of the relative productivity of those being compared. Measures of academic productivity are routinely limited to research results only. Definitions of productivity in the literature assume a basic, common teaching load that does not vary sig-

nificantly; as a consequence, research results are considered to be the only real and variable result of the academic production function. The basic measures of productivity used in the literature will be examined in this section.

Perhaps the most frequently used measure of productivity is the number of journal articles a faculty member has published (e.g., Cole & Cole, 1967; Crane, 1970; Hagstrom, 1971; Long, 1978). Theoretically, this measure is favored because of the importance of journal articles in the information dissemination process and because of the emphasis on reporting research results. The latter emphasis assumes journal articles are a good surrogate for research work. Operationally, the number of journal articles published is both verifiable and objective. University publication lists, abstract services, and bibliographical listings all provide reasonable sources for measuring the journal article productivity of a faculty member. Because the universe of journals can be defined and because authorship is rarely in question, there is little argument about the determination of the articles to be attributed to a particular author.

Although journal articles are the most frequently used measure of productivity, the number of books and monographs is also used, sometimes separately and sometimes combined with journal productivity (Katz, 1973; Tuckman, Gapinski, & Hagemann, 1977). Although the count of longer publications is as objective and verifiable as

the number of journal articles, books and monographs require a different type of effort. Books often do not stress research results but are rather a reflection of general scholarly effort. Fields which emphasize research results rely more heavily on journal articles (e.g., the hard sciences). Since much of the early work on academic productivity has been centered on the sciences (Cole & Cole, 1967; Hagstrom, 1971), book and monograph production have received little emphasis as productivity variables. In nonscientific fields, book publication may in fact have a much stronger relation to research.

Because of the difference in the type and quantity of work required to produce articles and books, it would seem best to keep their numbers separate. They are not additive without some equivalence function and a universal one has not been developed. For a discussion of one combination strategy, see Brittingham, Pezzullo, Ramsay, Long and Ageloff (Pezzullo & Brittingham, 1979, p. 106).

Beyond a reliance on editors and publishers, simple counts of articles and books can address only the quantity of an author's work and not the quality. Several researchers (Chubin, 1973; Cole & Cole, 1967) have examined the use of citation indices as a mechanism for measuring the quality of research. The results of their work indicate that citations were related to other measures of quality. For example, Cole & Cole (1967) found that the variable most highly correlated with peer ranking of significant contribu-

tions in psychology was the number of scientific journal citations to the author's work (p. 379). In another paper (1972), Cole & Cole found that Nobel laureates averaged over ten times as many citations as other scientists. Chubin (1973) noted that although "more than half of each cohort published at least one article or book, . . . only a third garnered one or more citations [p. 188]."

There are several problems with using citations as measures of academic productivity. From a procedural standpoint, citation listings do not cover all academic fields. Indices for the sciences are well-designed, while in other fields their development is more recent or nonexistent. A potential bias against the productivity of junior authors is found in the practice of listing only the first author of co-authored papers. There are, however, indications that this bias is not severe. Chubin (1973) found a correlation coefficient of .97 between the total citations and citations to single-authored works of scientists using the Science Citation Index (p. 189).

Some productivity studies work with data from abstracts or bibliographical works (Cole & Cole, 1973; Crane, 1970). An alternative source is the faculty members themselves (Allison & Stewart, 1974; Astin & Bayer, 1975; Hagstrom, 1971). However, few studies use self-report measures because of the relative difficulty in surveying a significant number of subjects. Self-report measures also may be suspect because of possible respondent bias. However,

Allison and Stewart (1974) found a correlation of .94 between self-reported number of publications and results from a survey of abstracts. Their results indicate that respondent bias was not a significant problem in requests for publication data.

Prestige

Although the importance of research productivity in the description of the academic effort cannot be contested (Long, 1979; p. 147), other factors are also important (Long, 1979; Pezzullo & Brittingham, 1979). Complementary to the use of research productivity is the inclusion of prestige, which Caplow and McGee (1958) describe as "not a direct measure of productivity but a composite of subjective opinion [p. 110]." They further explain that it consists "in essence, of what other people think about a man [p. 104]."

The clearest, externally-grounded measures of prestige are departmental affiliations. It is unclear whether the subjective opinions of a person held by peers are the result of or the cause of departmental placements. Regardless of the direction of causality, the relationship is clear.

Departmental affiliation need not be current; it may be a past location, a current affiliation, or an expected location. Long (1978) used selectivity of a subject's baccalaureate institution as a variable in his study of prestige and productivity among scientists. He noted that this variable, which "has been interpreted . . . as a measure of the quality of baccalaureate education,

has been shown to be a moderately successful predictor of future success [p. 893]." Long also used prestige rankings for the scientist's doctoral or postdoctoral institution. Crane (1970) used prestige rankings for graduate schools and hiring departments in a study of the academic marketplace. She found that "the prestige of doctorate has more influence than scholarly performance upon selection for a position in a leading academic department [p. 961]." Caplow and McGee (1958) lamented the critical nature of the doctoral department: "Unfortunately, as we have seen, the initial choice of a graduate school sets an indelible mark on the student's career [p. 193]."

In the area of prestige accruing from doctoral affiliation, inbred faculty are in a peculiar position. Since the prestige of their doctoral program and of their current department are the same, it is unlikely that prestige resulting from the doctoral institution is a critical positive variable in the hiring process unless the department is unable to attract any candidates from other departments with equal or higher prestige.

Departmental affiliations need not be for training in order to confer prestige. The ranking of the department in which a faculty member holds a position also influences the subjective evaluation of that individual's performance. Caplow and McGee (1958) discussed the effects of employment prestige and its results:

The higher the rank of the department . . . the more it serves its individual members by conferring a derivative reputation on them. This reputation tends to make them more desirable to other universities, more independent of their own, and more inclined to mobility [p. 91].

An important factor in this observation is the linkage between prestige and mobility. It would seem that the greater an individual's prestige, whether derived from identification with his employing department or from other sources, the greater the individual's marketability. The higher an individual's prestige, the more likely the person has received offers for employment by other institutions, especially if the individual has made known a willingness to consider other offers.

Prestige can also be measured by honorary degrees, awards, and memberships or fellowships in honorary societies. Although these awards are often viewed as rewards for prior research accomplishments (Cole & Cole, 1967), they generally confer an increase in prestige on the recipient.

Other Descriptive Variables

The preceding sections on productivity and prestige measures reflect the biases of much of the sociological research on faculty. As the introduction to productivity variables notes, the modal view of the output of academic work is peculiarly limited to published

scholarly research. There are also several descriptive variables of interest which have not often appeared in sociological studies, but which are essential for the evaluation of reward systems. Additional output measures and other individual descriptive variables will be discussed in this section.

The research-based conceptualization of academic productivity assumes either that all teaching requirements are equivalent and therefore need not be considered or that teaching is optional and that professors first allocate whatever time they choose to research and all other university obligations compete for whatever is left. Researchers often choose to ignore or minimize any stated goal of an institution other than research. That teaching and service may also have legitimate claims to a faculty member's time is a reality too easily avoided. However, it need not be. The quantitative aspects of teaching demands can be measured by number of contact hours per week, or perhaps more accurately, by number of student credit hours (i.e., of credit hours per course x number of students in class). If data were available from an acceptable instrument, teaching expertise could be included as a qualitative measure of pedagogical efforts (Doyle, 1979; Martin & Williams, 1979).

Service, in the traditional sense of community outreach activities could also be measured in terms of contact hours. An average measure over a long period of time would smooth out fluctuations

caused by the usually intermittent nature of these activities.

A recent development in the area of outreach by universities is the expansion of paid consulting services. In those areas of the curriculum where academician's skills are in demand in the marketplace, income from noninstitutional sources is a surrogate for service activity.

Administrative activity is also ignored in classical productivity measures. Efforts in departmental or institutional governance could be measured in terms of the number of administrative assignments or hours devoted to them. For example, Tuckman (1979) asked respondents to identify their major work activity as administration, teaching or research. She also asked whether respondents had any prior administrative experience.

A final omission in the routine operationalization of productivity is "grantsmanship." For some faculty and institutions, the ability to capture external support is critical. Beyond benefits in terms of release time or support for the individual faculty member, grants provide much needed financial support for the institution through overhead assessments. Although the works supported by the grant may result in publications, and therefore be reflected in classic productivity measures, the extra effort and benefit from outside support will not be properly disclosed. One measure for "grantsmanship" is the dollars of support received. An alternative is the number of proposals authored (Brittingham, Pezzullo, Ramsay,

Long & Ageloff, 1979).

Although most sociological studies do not include much data about the individual subjects themselves, demographic data is often used in economic studies, especially those on discrimination. Race, sex, and, more recently, age are most often used to stratify examples, while discipline and experience are included as independent variables. Only experience presents any measurement difficulties. Chronological age may be used as a surrogate for experience, assuming that the difference between starting times among individuals is insignificant. Other researchers (Tuckman, Gapinski & Hagemann, 1977) computed a more exact years of experience by subtracting the year of Ph.D. receipt from the year of study. Ramsay (1979) noted that years since terminal degree or age are correlated, but not perfectly, with experience (p. 41). The first, he argued, is a minimum measure as it is likely that an individual's experience began before the post-doctoral period.

Rewards

Researchers have taken many different views of the rewards to work as a faculty member. From sources external from the institution, a faculty member may receive honorary degrees, awards, and invitations to membership in select societies (Cole & Cole, 1967; Crane, 1979). The disciplinary community as a whole also provides recognition through attention to research, most commonly manifested in citations. Cole & Cole (1967) made note of Waterman's view that

citations operate "as a greater incentive for scientists than more formal recognition, like prizes and awards [p. 384]."

Although external rewards are by no means trivial, especially to faculty who prize their mobility, the primary focus of this research will be on rewards dispensed within the institution. It is the university that exercises the decision to hire the inbred scholar and that is most likely to be sensitive to inbred status.

Within the institution, rewards may come in many forms. Tri-vett (1978) found that

Compensation is an inclusive term that could embrace all forms of economic and noneconomic rewards a person might receive for higher education. Psychic gratification from relatively high social and professional status and the challenge of teaching are types of compensation for work in higher education [p. 1].

The report went on to draw on work by Furniss for an enumeration of examples of compensation

Compensation also includes such benefits as office space, faculty club memberships, perhaps a parking place, and particularly for faculty members, the opportunity to earn additional income by applying knowledge outside the institution [p. 1].

These noneconomic rewards, especially the last one, are by no means trivial. But, due to the difficulty of estimating dollar

equivalents, the emphasis in this research will be on salaries. Direct cash payments for services rendered to the university are the most objective, verifiable measure of reward.

Much has been written on salaries in higher education. Of interest to the research questions in this study is the development of a methodology for identifying wage discrimination. As a result of the inclusion of academic employees under the Civil Rights Act (1964) through the Education Amendments of 1972, there has been much concern about the identification, measurement, and abolition of wage discrimination in higher education. Nevill (1975) and Pezzullo and Brittingham (1979) provided a summary of methods to compare salaries for different groups. These studies, like most others on wage discrimination in higher education, focused on the problem of discrimination against women, but the methodologies discussed could be applied to any affinity group. Nevill noted that the traditional procedure is to compute and compare averages for various groups. This method ignores any within group variance in important variables and therefore does not yield results which can be strictly interpreted as measures of discrimination. Morse (1979) demonstrated that the comparison of means may be misleading. In his simulation, means for an unbiased school appeared unfair, while the same data for a biased institution appeared fair.

There are two other methods which allow the variance on a number of significant variables to be included in the computation:

pairing (also referred to as counterparting) and multiple regression models. The former requires that each member of the subject group be paired with a member of the "favored" group who has the closest similar qualifications. Ideally, the match in characteristics should be so close that any discrepancy in salary could be attributable to group membership and, therefore, to wage discrimination. It is, however, very difficult, especially given the many relevant characteristics and the small size of most faculties, to accurately match professors with any reliability (Pezzullo & Brittingham, 1979, p. 4). Across institutions, pairing is almost impossible to operationalize because of the difficulty of determining the effect of institution on individual salaries.

The most powerful and frequently used technique to identify wage discrimination is multiple regression analysis. Whether examining the existence of discrimination (Ramsay, 1979; Scott, 1977; Tuckman, 1979) or the rewards of faculty skills (e.g., Tuckman, Gapinski, & Hagemann, 1977), multiple regression analysis is usually the technique of choice because of its capacity to include the variance from many characteristics through their inclusion as independent variables. Katz (1973), Tuckman, Gapinski and Hagemann (1977), and Tuckman and Tuckman (1976) used multiple regression analysis to examine the rewards for various faculty skills. Bayer and Austin (1975), Hoffman (1976), Johnson and Stafford (1974), and Scott (1977) used multiple regression analysis to assess the

existence of wage discrimination in faculty salaries.

To determine discrimination, a regression equation estimating salary in terms of selected characteristics is developed for the favored group. This equation is then used with the characteristics of the subject group to develop an estimate of each individual's salary as if that person belonged to the favored group. Assuming the independent variables reflect the basis for legitimate salary determination, any discrepancy must be due to group membership. A careful explication of this technique is presented in Ramsay (1979) and Scott (1977).

One difficulty in implementing this methodology is the choice of predictor variables (Ramsay, 1979; Scott, 1977). Ramsay cautioned against ad hoc modeling with cross-sectional data and describes four possible sources of difficulty: multicollinearity, proxy variables, specification error, and simultaneous equation bias. Scott compared the predictive ability of the several sets of independent variables shown in Figure 2.

Insert Figure 2 about here

We conclude from the pilot study that there is little gain in reliability of the estimated salaries of white males with a large number of predictor variables,

Models	1	2	3	4	5
Variables					
Year of Birth	X	X	X	X	X
Year of Doctorate	X	X	X	X	X
Number of Papers		X	X	X	X
Number of Books		X	X	X	X
Date Hired			X	X	X
Number of Ph.D.s			X	X	X
Year of Doctorate (squared)				X	X
Number of papers (squared)					X
Number of Ph.D.s (squared)					X

Figure 2. Variables included in Scott's (n.d.) models

Note. Scott, Elizabeth L. Higher education salary evaluation
(Washington, D.C.: American Association of University Professors).

and there may even be some loss considering the additional costs involved in obtaining the additional data; reliability does not justify requiring that many predictor variables be used.

However, it may be that more consistent estimates of salary inequities are obtained when more predictor variables are used in the salary estimates [1977, p. 15].

The use of regression analysis to examine salary equity is an accepted practice. The modeling process can also be used to test existing differentials for significance of relationships.

Summary

The literature evaluating the relative merits of inbred faculty is ambiguous. Eells and Cleveland (1935a & 1935b) argued that while the hiring of inbreds may be "distinctly narrowing," it is often undertaken as a "measure of economy." Although they concluded that noninbreds are more productive, the lack of an examination of confounding factors renders their conclusions suspect.

While Hollingshead (1938) cited pride, familiarity and docility as reasons for inbreeding at Indiana University, McGee (1960) argued that inbreeding at the University of Texas was a "functional necessity" to allow the University to compete in the labor market (p. 483). McGee's analysis of various job factors over inbred and noninbred faculty indicated that the former do not

represent "inferior quality [p. 488]." Gold and Lieberman (1961) used McGee's study to demonstrate the need for multivariate analysis by adding possession of a doctorate in a secondary analysis. They concluded that Texas favored inbred faculty. McGee's (1961) reply included source as well as possession of terminal degree. Based on this second expansion of the original work, McGee again concluded that inbreds were subject to discrimination.

Hargens and Farr (1973) found inbred scientists to be slightly less productive than noninbred ones. The coefficient for inbred faculty productivity in their results was uniformly negative, but often insignificant. The pessimistic ambiguity of the Hargens and Farr results is characteristic of the research on inbreeding. The literature is unified only in its assumption of the undesirability of the phenomenon. The studies, often restricted by methodological simplicity, do not present a clear statement on either the relative merits of inbred faculty or on the individual or institutional motivations to practice inbreeding.

The early and still dominant definition of productivity for faculty is based on research productivity. The emphasis on publication of journal articles and books, and on citations to previous works reflects the frequent focus on faculty from scientific disciplines where such data is both available and reliable. A derivative definition of research productivity can be found in the opinions of a faculty member's peers (Caplow & McGee, 1958).

The inclusion of teaching and service as well as research in the definition of productivity is desirable (Long, 1979). Administrative activity is also important, especially in the analysis of salaries as prior or current administrative service was found to have a positive impact on compensation (Tuckman, 1979). Measurement techniques in these areas are not as well-developed as those in research productivity.

Rewards to academic productivity may take many forms (Trivett, 1978). The focus of this research was on institutional salary as a measure of reward. The pattern of rewards will be evaluated through the use of multiple-regression analysis (Ramsay, 1979; Scott, 1977).

Chapter 2 has surveyed the literature on inbreeding, academic productivity, and rewards. Chapter 3 describes the methodology for a study extending the research on inbreeding to cover differences between male and female inbred faculty. The description of the individual subjects for the determination of the differences was based on many of the variables described in this chapter. Multiple regression analysis was used to identify and test for discrimination in compensation.

Chapter 3

THE METHODOLOGY

The objective of this study was to build on existing research by expanding on the studies presented in Chapter 2. The 1977 survey of the American Professoriate was selected as the data base because it provided the most recent and comprehensive data on college and university faculty. The Survey is described in the first and second sections of this chapter, with the first section focused on the sampling procedure and the second section concerned with the questionnaire. (The text of individual questionnaire items is reproduced in Appendix A.) There are seven statistical hypotheses, derived from the three research hypotheses presented in Chapter 1, which are presented and explained in the third section of the chapter. Analyses used to test the statistical hypotheses are described in the fourth section.

The Sample

The data for this research was taken from the 1977 Survey of the American Professoriate. This instrument was designed and implemented under the direction of Everett Carll Ladd, Jr. and Seymour Martin Lipset and is described in detail in MacDonald (Note 2). Questionnaire development and data management were handled by the staff of the Social Science Data Center of the University of Connecticut.

The Survey was chosen as an appropriate sample for this research because of its breadth. As noted in Chapter 2, most studies of inbreeding are limited to a single institution or a narrow range of disciplines. The 1977 Survey encompasses 160 institutions and includes faculty from virtually all major academic disciplines. The breadth of the data base allows a level of generalization which has not been approached in inbreeding research since the Eells and Cleveland (1935a, 1935b) studies.

The 1977 Survey is based on a sampling process which began with the random selection of the institutions within a quota system based on the classification of the Carnegie Council on Policy Studies in Higher Education. Within each chosen institution, a predefined proportion of full-time faculty were chosen as a pool for the final sampling process. These proportions were adjusted to compensate for the over-sampling from the doctoral-granting category at the institutional level. Of the individuals in the pool, 33.7% were chosen randomly for the core sample. The development of the core sample through the sampling scheme is shown in Table 3.

Insert Table 3 about here

Of the 8,967 questionnaires mailed out, 4,607 were returned. Of the 4,607 returned 224 were unusable because of irregularities in the manner in which they were filled out or because the respon-

Table 3
Sampling Scheme

Tier level	Carnegie classification	<u>Schools</u>		Proportions of faculty chosen	Core sample pool	Core sample
		Number	Percent			
1.	Doctoral-Granting Institutions	80	50	1/6	13,404	4,512
II.	Comprehensive Universities and Colleges	40	25	1/6	2,262	762
III.	Liberal Arts Colleges I	13	8	1/3	519	175
IV.	Liberal Arts Colleges II	6	4	1/3	139	47
V.	2-Year Colleges	21	13	1/4	898	303
	Total	160	100		17,221	5,799

Note. From Technical Report: 1977 Survey of the American Professoriate by R. K. MacDonald. Storrs: The University of Connecticut, Social Sciences Data Center, February, 1978, p. 2.

dent was ineligible for the study. MacDonald (Note 2, p. 7) computed the "actual, adjusted response rate" as 51.7% (4,383 usable responded divided by 8,473). This is "the proportion of the faculty eligible and able to participate in our study who chose to return a completed questionnaire [p. 7]."

Basic demographic data for the distributions of respondents by sex, rank, and type of control of institution are presented in Table 4. Also included in Table 4 are comparable data drawn from

Insert Table 4 about here

a report developed by the National Center for Education Statistics (NCES) (1977). MacDonald (1978) used the NCES population data and data from earlier Carnegie and ACE (American Council on Education) surveys to demonstrate that the respondents to the 1977 Survey were representative of the American professoriate. As MacDonald concluded and as indicated by the data in Table 4, the comparisons show that the Survey is consonant with other population and sample data and therefore there is reason to have "confidence in the accuracy of the 1977 Survey as a portrait of the American professoriate (p. 19)."

Not all observers share MacDonald's (1978) confidence. Several aspects of the 1977 Survey have been the subject of significant controversy in the popular press. Most of the criticism focused on two areas: response bias and question ambiguity. Dalenius

Table 4
Demographic Distribution of Respondents
(in percent)

	1977 Survey	NCES ^a
Male	81	77
Female	19	23
Professors	32	27
Associate Professors	25	29
Assistant Professors/Instructors	43	44
Public	73	69
Private	27	31
University	42	35
4-Year Institution	40	54
2-Year Institution	19	10

^aNational Center for Educational Statistics

Note. From Technical Report: 1977 Survey of American Professoriate by R. K. MacDonald. Storrs: The University of Connecticut, Social Science Data Center, February, 1978, p. 23.

(1979, p. 27) cited the former: "The implementation of the sampling design can only be characterized as a complete failure: The non-response amounted to roughly 50 percent." In response to this criticism, Lipset argued that

the return rate was by no means low for a long written questionnaire and that in a 1975 survey 500 nonrespondents were asked by telephone three questions from various sections of the questionnaire. "We found that the response pattern was almost identical," he said, adding that it was reasonable to assume that this would also apply to the 1977 Survey [Fiske, 1979, p. C4].

In addition to the 1975 survey of nonrespondents, two other steps were taken with respect to the response bias issue. First, and of some controversy itself, was the use of a weighting system to compensate for sampling errors, variations in response rates, and the intentional oversampling of certain groups. The weighting system is detailed in MacDonald (Note 2). The calculations used in deriving the weights are presented in Figure 3. Steps 2 and 3

Insert Figure 3 about here

were performed only on cells which were the subject of initial oversampling.

The second step taken to deal with the response bias question

1.
$$\frac{\text{1975 Percentage of Total Cases}}{\text{1977 Percentage of Total Cases}} = \text{Core Weight}$$
2.
$$\frac{\text{Number of Core Cases}}{\text{Number of Total Cases}} = \text{Adjustment Factor}$$
3. Core Weight X Adjustment Factor = Preliminary Weight
4. Preliminary Weight X 2 = 1977 Weight

Figure 3: Calculations used in deriving weights

Note. From Technical Report: 1977 Survey of the American Professoriate by R. K. MacDonald. Storrs: The University of Connecticut, Social Science Data Center, February, 1978, p. 12.

was the comparison of the weighted results to data from other sources. A sample of these comparisons is given in Table 4. With only minor exceptions, the 1977 Survey results appeared similar to the other data. MacDonald (Note 2, p. 21) presents rank, field, and institution-type data for weighted and unweighted respondents and for nonrespondents. Except for the areas of intentional oversampling, the distributions were similar.

The second general area of concern was question ambiguity. Lang (Fiske, 1979, p. C4) argues that none of the responses to a request for a measure of agreement with a statement expressing an opinion about the government were acceptable. Ambiguity of wording criticisms were focused on the opinion items of the Survey. As this research utilized only questions asking for specific information (such as, rank and number of publications), the assertion of question ambiguity did not apply and did not receive further consideration.

The question of bias in responses to specific items posed a more difficult problem for this research. The most sensitive questions used in the research asked for salary data. MacDonald (1978, p. 19) noted that the 1977 Survey salary average was above both of the results from other studies. There was, however, no reason to believe that any group of concern in this research was more prone to response manipulation than any other group. Therefore, for the purposes of testing for relative differences, the data was

deemed sufficient.

The Questionnaire

The questionnaire was designed by Everett Carll Ladd, Jr. and Seymour Martin Lipset with the help of the staff of the Social Science Data Center and several contributors: Robert Merton, Harriet Zuckerman, David Palmer, Michael O'Leary, Maryse Eymonerie, Leonard L. Ross, and Alice Rossi (MacDonald, 1978, p. 5). The instrument was pretested on a group of 50 of the designers' colleagues. These subjects were asked to evaluate the questions, design, and layout of the questionnaire.

The instrument included 128 questions covering 10 general areas: current concerns in higher education, the financial state of higher education, academic standards, faculty organization and collective representation, academic career data, faculty "renewal," national affairs, biographical data, norms of science and scholarship, and professional activities in foreign countries. Although the research hypotheses discussed in Chapter 1 were not considered in the design of the questionnaire, the data required to test them was included in the sections covering academic career, faculty renewal, and biographical data. The data available for each of the categories of variables presented in Chapter 2 will be discussed. (Copies of the questionnaire items relating to each category are included in Appendix A.)

Inbreeding

Comparison of the responses to a request for a list of degrees, granting institutions, and years of award (Question 32) with institutional identification which was determined in the sample selection process yielded a measure of inbred status. However, since the anonymity of the respondents was guaranteed, institutional affiliations were not released in the data base. To compensate for this, Ms. Sally Daniels of the Roper Center constructed six new variables matching current affiliation with the origin of each degree individually, with the origin of the highest degree only, and with the origin of any degree. These six variables allowed the identification of each subject as inbred or not inbred according to any single degree the individual holds or according to any combination of degrees. When combined with the specification of the highest degree (Question 32), the new variables allowed the identification of inbreeding at the terminal degree level. Throughout this research, subjects are defined as inbred if they received their highest degree from the institution at which they are employed. "Silver cording," the practice of institutions hiring their own graduates only after a period of teaching at another institution, was identified by combining the new variables and the number of institutional employers (Question 34).

Research Productivity

The data base provided separate variables for the lifetime

production of journal articles (Question 48), and for the lifetime production of books and monographs (Question 47). The recent rate of productivity was available through the response to separate requests for the number of books, articles, and other writings published or accepted in the last two years (Question 49). In addition to these traditional measures of research productivity, information on the procurement of research grants was also available. Respondents were asked if they had ever received funding (Question 50) and if they had received funding in the last 12 months (Question 51). They were also asked to categorize the sources of the funds that were the basis for positive answers to Questions 50 and 51 (Question 52).

Prestige

Unlike research productivity, prestige is a construct without accepted measurement criteria. As suggested by Caplow and McGee (1958, p. 91), mobility will be used as a surrogate for prestige. Respondents were asked whether they had received an offer of another job or a serious inquiry about availability within the last 2 years (Question 71). They were also asked whether they had sought or made serious inquiry about another position in the last 2 years (Question 72).

In addition to the mobility data cited previously, the questionnaire also asked "Comparing yourself with other academic persons of your age and qualifications, how successful do you consider

yourself in your career?" (Question 79). Although the question seems directly aimed at the concept of prestige, the "halo" effect of self-reporting by an ego-involved subject may yield results which do not adequately differentiate the various categories of respondents. Insufficient dispersion would require the exclusion of this variable from the analysis.

Other Descriptive Variables

To balance the common emphasis on reserach activities, data was collected on other descriptive variables. The 1977 Survey asked each respondent to specify how many hours per week were spent on various activities: administration, scheduled teaching, preparing for teaching, advising and counseling students, and research and scholarly writing (Questions 41 and 42). Unlike the research variables listed previously, the specification of hours of activity is a description of effort rather than results.

Work as a paid consultant is an increasingly important service option for many academics. Data on all consulting work and on work within the last 2 years was included in the Survey (Questions 53 and 54). For both time periods, respondents were asked to specify the source of the consulting engagement (Question 55). Respondents were not asked to report consulting income, however, they were asked how much was earned above base salary (Question 45). While this income could come from any source, consulting is probably the single greatest source of outside revenues for most

professors.

In addition to the information provided by responses describing allocation of time, important insights into faculty activity were gained from the respondents' perceptions of their roles. The Survey requested that each subject choose the terms which were the best and poorest descriptors of the subject from a list of five terms: intellectual, professional, scholar, scientist, and teacher. The respondents were also asked to evaluate whether their primary interests lie in research or teaching (Question 57) and whether or not their work is pure, applied, policy oriented, or literary (Question 58). A final question in this area (Question 59) asked the subjects whether their work is primarily theoretical or primarily experimental, if that distinction is relevant to their discipline.

Compensation

Respondents were asked to indicate their gross institutional salary (Question 43) and to indicate whether the salary is based on a calendar or an academic year (Question 44). Responses to the gross salary question are scaled in uneven dollar increments. As noted in the discussion of consulting, the Survey also asked how much respondents had earned above their basic salary (Question 45).

Demographics

Descriptive data on rank, tenure status, field, and personal characteristics were included in the Survey. Respondents were

asked their present rank (Question 38) and the number of years in higher education, at their present institution, and in their present rank (Question 35a, 35b, and 35c). Included in the responses to the request for information on the type of current appointment were separate categories for tenured and untenured positions (Question 39). Subjects with tenure were also asked to give the year in which tenure was awarded (Question 40).

Respondents were asked to give fields of specialty relating to four career factors: the field in which the postgraduate degree was taken; the field in which the current appointment was held; the principle teaching field; and the primary field of research, scholarship, and creativity (Question 46a, 46b, 46c, and 46d).

In addition to the professional demographics discussed previously, subjects were asked for sex, age, race, and marital status (Questions 46, 108, 109, 112, and 106).

Statistical Hypotheses

The data derived from the 1977 Survey was used to test the research hypotheses which were generally stated in Chapter 1. The first step in the analytical process was the derivation of more specific statistical hypotheses and the selection of methods for testing them. The hypotheses are described in this section of the chapter and the procedures guiding the analysis are explained in the subsequent section.

The first research hypothesis deals with the relationship of

sex and institutional origin to productivity: Female inbred faculty have patterns of productivity which are significantly different from the patterns of productivity of male inbred faculty. Restated as a statistical hypothesis this becomes the null listed below:

H_1 (Null)--there is no difference in productivity between female and male inbred faculty.

The second research hypothesis relates institutional origin to professional advancement: Inbred faculty show less professional advancement than outbred faculty. Retention, rank, and tenure status are the significant professional variables in higher education. Because of the cross-sectional data and the difficulty in operationalizing the dependent variables, some ingenuity was required to develop statistical hypotheses in this area.

A problem in the specification of the hypotheses on professional advancement is the effect of sex on the dependent variables. As this research is interested in the differential effect of institutional origin on females and males, the hypotheses are separately stated for each sex. The effect of this design is to determine whether inbred faculty are treated significantly different from noninbred faculty of the same sex.

The question of retention is a significant one for inbred faculty. Bias against the very fact of inbreeding may lead to premature discontinuance which would not be justifiable on other grounds. The impact of institutional origin on longevity in the

first position is considered in statistical hypothesis two:

$H_{2a}(\text{Null})$ --there is no difference in the rate of retention at the first position between inbred and noninbred male faculty,

$H_{2b}(\text{Null})$ --there is no difference in the rate of retention at the first position between inbred and noninbred female faculty.

A critical measure of professional advancement is the years a faculty member serves before being promoted. Possibly, one detrimental effect of inbred status is the requirement of greater time in a lower rank for promotion. The third and fourth statistical hypotheses examine the timing of promotions:

$H_{3a}(\text{Null})$ --there is no difference in years served prior to promotion to associate professor between inbred and noninbred male faculty of that rank,

$H_{3b}(\text{Null})$ --there is no difference in years served prior to promotion to associate professor between inbred and noninbred female faculty of that rank,

$H_{4a}(\text{Null})$ --there is no difference in years served prior to promotion to full professor between inbred and noninbred male faculty of that rank,

$H_{4b}(\text{Null})$ --there is no difference in years served prior to promotion to full professor between inbred and noninbred female faculty of that rank.

The achievement of tenure is essential to long-term professional advancement among faculty. Research on the tenure decision

process requires information on those denied tenure as well as those given tenure. Cross-sectional data from faculty in existing positions is insufficient to model the tenure decision. However, some conclusions can be drawn from the existing data.

As hypotheses three and four can test time to promotion only for those who have been promoted it is possible that a bias against one group might not be apparent in these tests. If the bias resulted in a person being held at a lower rank, the individual would never enter the sample for a test of time to promotion. Hypothesis five examines the effect of institutional origin and sex on the very fact of promotion:

H_{5a} (Null)--there is no difference in the distribution of ranks between inbred and noninbred male faculty.

H_{5b} (Null)--there is no difference in the distribution of ranks between inbred and noninbred female faculty.

Analogous to the number of years served prior to promotion is the time served before the granting of tenure. It is possible that a bias against inbred faculty may result in an increase in the time required prior to the receipt of tenure. The sixth hypothesis examines the relationship between sex, inbred status, and service prior to the granting of tenure.

H_{6a} (Null)--there is no difference in the years served prior to the receipt of tenure between inbred and noninbred tenured male faculty,

H_{6b} (Null)--there is no difference in the years served prior to the receipt of tenure between inbred and noninbred tenured female faculty.

In addition to professional advancement, faculty members also receive compensation as a reward for their efforts. The third research hypothesis, relating institutional origin to levels of compensation, is embodied in the seventh statistical hypothesis:

$H_7(\text{Null})$ --there is no difference in institutional rewards between inbred faculty and outbred faculty.

Analysis

The seven statistical hypotheses in the previous section were tested using the 1977 Survey data. Unless otherwise noted, only faculty with Ph.D., Ed.D. or other non-professional doctorates were included in the analyses.

Statistical Hypothesis One

The first statistical hypothesis examines the difference between the productivity of male and female inbred faculty. The analysis for this hypothesis started with the extraction of the male and female members of the inbred faculty as subsamples. Discriminant analysis was performed to develop a model for differentiating between the two groups using productivity values as predictor variables.

When discriminant analysis is used to determine whether there are significant differences between defined groups, two assumptions must be met. The predictor variables must be normally distributed and have equal dispersion matrices. The latter need not be known; it is equality and not magnitude which is assumed.

The standard test to determine the significance of the difference between two groups in discriminant analysis is the Mahalanobis D^2 . This statistic measures the separation of the group means along the discriminant axis and is distributed as an F-statistic in the two-group case (Green & Tull, 1975, p. 458).

Statistical Hypothesis Two

The second statistical hypothesis examines the relationship between institutional origin and retention. The latter is specified as retention at the first academic position. Ideally, this hypothesis should be tested with longitudinal data following 1 or more cohorts through the early career years. As this analysis is not possible with the 1977 Survey data, a cross-sectional substitute was devised.

The sample was divided into cohorts based on the year in which each subject was awarded a terminal degree and on sex. The subjects in each cohort were identified as inbred or noninbred and as holding their initial appointment or holding a second or subsequent appointment. The significance of the difference in the frequency of retention between inbreds and noninbreds was tested separately for each cohort using a Chi-square test.

Not only did this analysis provide information on each cohort's retention rates, it also allowed observation of changes in the pattern of significance over the various year groups. To the extent that multiyear, cross-sectional data can be used to generalize

about individual career progression, the changes in the significance across cohorts of increasing experience provided information about retention prospects for early and future cohorts.

Statistical Hypotheses Three and Four

The third and fourth statistical hypotheses examine the timing of promotion to associate- and full-professor, respectively. Testing these hypotheses began with the selection of 4 subsamples based on rank and sex at the time of the Survey: 2 for associate professors, male and female; and 2 for full professors, male and female. The former are used to test hypothesis three and the latter, hypothesis four.

As productivity variables have a significant influence on rate of promotion, the analysis used for the hypotheses controlled for these effects through the use of analysis of covariance. The dependent variable was years served prior to promotion to present rank; the treatment variable was institutional origin; and, the covariates were productivity measures.

Statistical Hypothesis Five

Statistical hypothesis five examines the relationship between institutional origin, sex, and promotion. A Chi-square test was used to compare ranks to institutional origin for each of 2 subsamples based on sex.

Statistical Hypothesis Six

The relation between the time served prior to the granting of

tenure and institutional origin is the subject of the sixth hypothesis. Subsamples were drawn for female and male tenured faculty. Combination of information on the year in which subjects first taught and the year in which they got tenure allows a determination of the years served prior to the receipt of tenure. As years to tenure may be at least partially based on productivity, analysis of covariance controlling for productivity measures was used to test this hypothesis.

Statistical Hypothesis Seven

The seventh statistical hypothesis examines the relationship between institutional rewards and origin. The dependent variable for the analysis is salary. As outlined in Chapter 2, the methodology for testing this hypothesis was developed to identify discrimination usually due to race or sex. In this analysis noninbred faculty were considered the favored group.

The basic identification methodology started with the development of a regression model explaining the salary of noninbred faculty in terms of predictor variables including several demographic characteristics, research productivity, prestige, and other descriptive variables. (The exact specifications of the model are given in Chapter 4.) The next step in the analysis was to substitute the independent values for each inbred subject into the regression equation to obtain individual predicted salaries for the inbred group. These predicted salaries reflect the level of com-

pensation an inbred faculty member would have received if he or she had been compensated on the same basis as a noninbred person.

Previous work (surveyed in Chapter 2) on the use of regression analysis in salary inequity proceeds from the determination of predicted salaries for the unfavored group by inspection. As the methodology was designed to support decision-making about salary adjustments in individual cases, no hypothesis testing extension had been developed. For the purposes of this research, it was necessary to test the significance of the differences between the predicted and actual salaries of the inbred subjects. This was done by performing a t-test on the predicted and actual salaries.

Summary

The research strategy presented in this chapter was directed at gaining generalizability through breadth using the most comprehensive data base available. The 1977 Survey of the American Professoriate was designed and implemented under the direction of Everett Carlil Ladd, Jr. and Seymour Martin Lipset. It included 128 questions covering a broad range of academic concerns and was sent to 8,967 faculty members. Of the 4,607 returned, 4,383 usable responses were obtained.

Data for the items which described the various categories cited in Chapter 2 (research productivity, prestige, other descriptive variables, compensation, and demographics) were used in this analysis. Several "custom" variables were added to the basic data base

to allow the identification of inbred faculty without compromising any respondent's anonymity.

There were six statistical hypotheses derived from the three research hypotheses listed in Chapter 1. The translation of the first hypothesis, relating sex of inbred faculty to productivity, and the third hypothesis relating institutional origin to compensation, were straightforward.

Operationalizing the second hypothesis was more problematical because of the lack of longitudinal data and difficulty in specifying the dependent variables. The result was four hypotheses which examine the relationship of institutional origin to retention rates, years served prior to promotion, and contract status.

Determination and evaluation of salary differences required the addition of an hypothesis test to the accepted identification mode. Testing the statistical hypotheses involved discriminant analysis, Chi-square tests, analysis of covariance, and regression analysis leading to a t-test. The results of these analyses are presented in the next chapter.

Chapter 4

THE RESULTS

The findings of the analyses proposed in the description of the methodology are reported in this chapter. After an initial section that provides some comparative descriptive statistics, the results of each of the statistical hypotheses are presented. The chapter concludes with a discussion of the findings.

Inbreeding Past and Present

One benefit of the research on inbreeding is the availability of statistical results from early studies for comparison with current findings. Before starting the specific tests described in Chapter Three, two kinds of descriptive statistics were run to obtain a better understanding of the composition of the sample and to provide results which could be compared to previous studies.

The computations for the percentage of inbred faculty with terminal degrees based on the Eells and Cleveland (1935a) data were presented in Chapter Two. Results for the 1935 data and comparable findings from the 1977 Survey are presented in Table 5. The rate of inbreeding for holders of the doctoral degree has dropped from sixteen percent to eleven percent.

Insert Table 5

Eells and Cleveland (1935a) also presented figures for the percentage of inbreeding in several academic disciplines. Corre-

TABLE 5

Percent of Total Faculty Inbred(Doctorate)	
1977 Survey	11.0
1935 Eells and Cleveland Study	16.1

sponding calculations were run on the 1977 Survey data. The results presented in Table 6 use the category names from the Eells

Insert Table 6

and Cleveland survey. One of the fields posed significant problems when the attempt was made to match it with the current data. The 1977 survey contained no separate category for ancient languages, hence the comparison of the earlier modern languages figure with the current foreign languages category is misleading and is omitted from the table. With the exception of the field of home economics, the percentages of inbred faculty have declined.

Statistical Hypothesis One

The first statistical hypothesis addressed the productivity differences between inbred men and women:

H_1 (Null) -- there is no difference in productivity between female and male inbred faculty.

The test of this hypothesis was based on discriminant analysis using the sex of the inbred faculty members to determine group membership. Only those subjects with academic doctorates (Ph.D., Ed.D., or other doctorates except first professional degrees) were chosen for the analysis. The data included 284 men and 50 women with doctorates granted by the institution at which they are currently faculty members. The actual number of subjects included in each of the analyses varied slightly due to the treatment of

TABLE 6
Percent of Inbred Faculty by Field

Field	Bells & Cleveland 1935	1977 Survey
Biological Science	40	14
Chemistry	37	6
Education	34	12
Physical Education	34	5
Mathematics	33	7
English	32	5
History	31	11
Physical Sciences	28	10
Social Sciences	27	6
Home Economics	22	22

missing data. Before the discriminant analyses were run, two preliminary steps were taken. An analysis was run to examine the distribution of subjects by academic specialty and several new variables were developed from items in the 1977 Survey. The analysis and the items are described in the next part of this section, prior to the discussion of the discriminant analysis.

As the norms for many of the productivity measures vary by fields, a preliminary Chi-square was performed to determine whether the distribution of the inbred faculty across fields varied according to sex. The test did not reject the null hypothesis that the distributions are drawn from the same population. The results of the test are shown in Table 7.

Insert Table 7

A concern about the comparability of measures of research productivity led to the creation of several new variables from items existing in the data base. To control for varying lengths of time served as a faculty member, the two variables for total article and total book production were divided by the number of years of experience since the granting of the most recent degree. The new variables, designated ARATE for articles and BRATE for books, reflect the rate of production per year of experience and can therefore be compared across subjects with different lengths of experience.

TABLE 7

Chi-Square Analysis of Field by Sex for Inbred Faculty

Sex	Field ^a			
	Social Sciences	Humanities/ Fine Arts	Natural Sciences	Applied Professional Fields
Males	51	26	82	116
Females	12	7	11	17

^a $\chi^2_{(3)} = 3.083, p = .379$

A second concern about the comparability of measures of research productivity is derived from data describing how the subjects allocate their time. An individual in a job situation which requires heavy non-research efforts cannot be fairly compared to an individual who is free to devote a large quantity of time to research. To control for the amount of effort devoted to research, ARATE and BRATE were divided by a measure of the number of hours devoted to research. The resulting variables, AREF and BREF, measure the rate of productivity per year of experience adjusted for the amount of time available (for articles and books, respectively.)

To guard against the homogenizing effect of the ARATE and BRATE computations, which would portray a person who had a prolific early career and no recent publications in the same way as a steadily producing person if the data were comparable, the number of books, articles, and other writings produced in the last two years was included. These variables were also adjusted for the amount of time devoted to research, resulting in new variables for two-year production of books (B2EF), articles (A2EF), and other writings (O2EF).

The basic technique used to evaluate the data for statistical hypothesis one was discriminant analysis. A stepwise procedure utilizing the smallest Wilks' Lambda as the criterion for variables selection was used. A complete description of the technique can be found in Nie, Hull, Jenkins, Steinbrenner, and Bent (1975).

Minor modifications of the procedure related to the 8.0 version of the Statistical Package for the Social Sciences are explained in Hull and Nie (1979). The test for the equality of the group centroids was an F ratio based on the Mahalanobis distance between the groups (Nie, et alia, 1975, p. 460).

Because of the broad range of productivity variables, several analyses were run. The first used all variables; the others utilized only one type of productivity measures: separate analyses were run for output (using each of 2 different definitions of research output) and for effort. The variables included in each of the analyses are presented in Figure 1.

Insert Figure 4

Analysis One

The first analysis included all the available productivity variables except those which were made redundant by the inclusion of the created variables reflecting effort in the measurement of research productivity (AREF, BREF, A2EF, B2EF, O2EF). The results of the discriminant analysis are presented in Table 8. Standar-

Insert Table 8

dized discriminant function coefficients are shown for each of the 11 variables chosen by the Wilks criterion. The F-test for the significance of the Mahalanobis distance between groups was

<u>Variable</u>	1	<u>Analyses</u>		3
		2a	2b	
Weekly hours of administration	X			X
Weekly hours of teaching	X			X
Weekly hours of preparation	X			X
Weekly hours of counseling	X			X
Weekly hours of formal instruction	X			X
Above salary earnings	X			X
Number of books published (last 2 years)			X	
Number of articles published (last 2 years)			X	
Other writings published (last 2 years)			X	
Receipt of research funding (ever)	X	X	X	
Receipt of research funding (last year)	X	X	X	
Service as paid consultant (ever)	X	X	X	
Service as paid consultant (last 2 years)	X	X	X	
Primary interest: Teaching/Research	X			
Research: Pure or Basic	X			
Research: Applied	X			
Research: Policy oriented	X			
Research: Literary or expressive	X			
Research: Theoretical or experimental	X			
Articles: Rate of production (ARATE)			X	
Books: Rate of production (BRATE)			X	
Articles: Rate of productivity adjusted by effort (AREF)	X	X		
Books: Rate of productivity adjusted by effort (BREF)	X	X		
Articles: Last 2 years' productivity adjusted by effort (A2EF)	X	X		
Books: Last 2 years's productivity adjusted by effort (B2EF)	X	X		
Other Writings: Last 2 years' productivity adjusted by effort (O2EF)	X	X		

Figure 4: Variables Used in the Analyses

TABLE 8

Results of Discriminant Analysis of All Productivity Variables

Variables in the Final Discriminant Function ^a	Standardized Discriminant Function Coefficients
Research funding in last 12 months	-.55
Percentage of above salary earnings	.49
Books: 2 year productivity adjusted for effort	.66
Books: rate of productivity adjusted for effort	-.81
Articles: rate of productivity adjusted for effort	.53
Service as a paid consultant in the last two years	.34
Research described as "applied"	-.36
Articles: 2 year productivity adjusted for effort	-.47
Research described as "policy- oriented"	.25
Weekly hours of formal instruction	.27
Weekly hours of administration	.24

^aF value = 4.01, p = .000

significant at the .001 level. The null hypotheiss of no difference between groups was rejected.

Analysis Two

The second analysis was designed to test for differences on output variables defined as standard research measures and indications of service as a consultant and of receipt of research funding. The analysis was run twice: the first run (2a) included research measures adjusted for both experience and effort; the second (2b) included an adjustment only for experience.

Table 9 shows the results of both the 2a and 2b analyses. Six

Insert Table 9

variables entered the first of the discriminant functions and 2 entered the second. Both F-tests were statistically significant at the .001 level. The hypothesis that the group centroids for output measures were equal was rejected.

Analysis Three

The third analysis included only variables reflecting the subjects distribution of effort. Weekly hours of administration, teaching, preparation, counseling, and formal instruction were combined with percentage of above salary earnings. The former are direct measures of input while the latter is a surrogate for hours spent outside the institution.

The results of the third analysis are shown in Table 10. Two

TABLE 9
Results of Analyses Using Output Variables

Variables in the Final Discriminant Function	Standardized Discriminant Function Coefficients
Analysis 2a: Adjusted for Experience and Effort ^a	
Research funding in the last year	.58
Books: 2 year productivity adjusted for effort	-.69
Books: Rate of productivity adjusted for effort	.84
Articles: 2 year productivity adjusted for effort	.75
Articles: Rate of productivity adjusted for effort	-.52
Other writings: 2 year pro- ductivity adjusted for effort	-.43
Analysis 2b: Adjusted for experience ^b	
Research funding in the last year	.91
Books: Overall productivity adjusted for experience	.34

^aF value = 4.28, p = .0004

^bF value = 6.67, p = .001

Insert Table 10

variables, above salary earnings and weekly hours of teaching, entered the equation. The distance between the groups was significant at the .01 level leading to the rejection of the null hypothesis that there was no difference between the groups on effort measures.

Statistical Hypothesis Two

The impact of institutional origin on longevity is considered separately for males and females in statistical hypotheses 2a and 2b:

H_{2a} -- there is no difference in the rate of retention at the first position between inbred and noninbred male faculty,

H_{2b} -- there is no difference in the rate of retention at the first position between inbred and noninbred female faculty.

These (and all other) hypotheses were tested only on faculty with academic doctorates holding positions at research or doctoral granting universities. This group was divided into cohorts based on the year in which the doctorate was received. Each hypothesis was tested separately for each of the cohorts. As it is unlikely that there would be a significant change in the patterns of retention beyond the tenth year, the analyses were run only for those receiving doctorates after 1967.

Chi-square tests were run to determine the significance of

TABLE 10
Results of Analysis Using Effort Variables

Variables in the Final Discriminant Function ^a	Standardized Discriminant Function Coefficients
Above Salary Earnings	.98
Weekly Hours of Teaching	-.35

^aF value = 4.70, p = .009

the relation between institutional origin and rate of retention. For cohorts with less than 21 cases, Fisher's exact test was used; for larger cohorts, Yates' corrected Chi-square was used. The results of the analysis for males are shown in Table 11 and for females in Table 12.

Insert Tables 11 and 12

As the Tables show, only two of the twenty tests were significant at the $p < .05$ level. There is no reason to reject the null hypotheses, which posit no relationship between the two factors. The number of inbred and noninbred subjects for each cohort is listed with the percentage of each group still in the first position.

The small number of inbred faculty in many of the cohorts makes the results involving these cells suspect. Generalizations which depend on small numbers of subjects are tenuous at best. To alleviate the problem of small cell n's, the Chi-square analyses were run again, separately for males and females, for all subjects in any of the ten cohorts. [Results of these analyses are shown in Table 13 for males and Table 14 for females.]

Insert Tables 13 and 14

The Chi-square results are significant at the $p < .05$ level for both the female and male faculty, indicating a rejection of

TABLE 11
 PERCENTAGE OF INBRED AND NONINBRED FACULTY
 HOLDING FIRST ACADEMIC POSITION BY YEAR OF DOCTORATE FOR MALES

Year Doctorate Conferred	INBRED		NONINBRED	
	Percent at 1st Position	Total n	Percent at 1st Position	Total n
1977	75.0	4	76.9	13
1976	75.0	4	61.5	39
1975	77.8	9	74.5	47
1974	80.0	10	59.5	84
1973	75.0	12	53.8	93
1972*	91.7	12	48.6	107
1971*	100.0	7	50.0	92
1970	75.0	16	54.5	110
1969	83.3	12	53.9	89
1968	76.9	13	45.5	99

* $p < .05$

TABLE 12

PERCENTAGE OF INBRED AND NONINBRED FACULTY
HOLDING FIRST ACADEMIC POSITION BY YEAR OF DOCTORATE FOR FEMALES

Year Doctorate Conferred	INBRED	NONINBRED	
	Percent at 1st Position	Total n	Total n
1977	50.0	2	6
1976	0.0	1	13
1975	71.4	7	25
1974	100.0	3	22
1973	100.0	2	16
1972	100.0	3	13
1971	66.7	3	18
1970	100.0	2	3
1969	66.7	3	13
1968	66.7	3	10

TABLE 13

CHI-SQUARE ANALYSIS OF INBRED AND NON-INBRED MALE FACULTY
HOLDING FIRST AND SUBSEQUENT ACADEMIC POSITIONS

Origin	Position ^a	
	First	Subsequent
Inbred	80	19
Noninbred	420	353

$$\chi^2_{(1)} = 24.075 \quad p = .000$$

TABLE 14

CHI-SQUARE ANALYSIS OF INBRED AND NON-INBRED
FEMALE FACULTY HOLDING FIRST AND SUBSEQUENT ACADEMIC POSITIONS

Origin	Position ^a	
	First	Subsequent
Inbred	22	7
Noninbred	77	66

$$\chi^2_{(1)} = 3.925 \quad p = 0.047$$

the null hypotheses that there is no relation between retention at the first position and institutional origin. The data shows a much higher percentage of inbred faculty still in the first position. This is contrary to the idea that inbred faculty are forced out of their first positions with a higher frequency than noninbreds.

Statistical Hypothesis Three

Statistical hypotheses 3a and 3b examined the relationship between years served prior to promotion and institutional origin for male and female associate professors:

H_{3a} -- there is no difference in years served prior to promotion to associate professor between inbred and noninbred male faculty of that rank,

H_{3b} -- there is no difference in years served prior to promotion to associate professor between inbred and noninbred female faculty of that rank.

One-way analysis of covariance was used to test the relationship between years to promotion and institutional origin while controlling for the effects of four important productivity variables. The number of covariates was kept to a minimum to meet the restrictions of the computational package. The four variables chosen as covariates were

Weekly hours of administration

Weekly hours of formal instruction

Number of books published (total)

Number of articles published (total).

The covariates were chosen because of their possible influence on the promotion decision. All four reflect productive efforts which affect the institution. The variables for total counts for books and articles were used rather than rates of production, because promotion decisions are more likely to be based on total works with some required threshold number. Rates of productivity would not differentiate between a first year person with two publications and a fourth year person with eight, while it is, of course, more likely that the latter would receive a promotion. The time spent in administration and formal instruction reflect the other two primary tasks which benefit the institution. No variables were included which measured time spent in consulting or other external activities as it was concluded that these efforts rarely have a significant impact on promotion decisions.

The results of the analyses (shown in Table 15) reveal the differential impact of institutional origin on years to promotion

Insert Table 15 About Here

to associate. The main effect, inbreeding, is significant at the $p < .05$ level for female faculty only. While one of the producti-

TABLE 15
ANALYSIS OF COVARIANCE RESULTS FOR YEARS SERVED
PRIOR TO PROMOTION TO ASSOCIATE

Source of Variation	F Value	F Significance
Males (n=614)		
Covariates		
Weekly hours of administration	2.621	0.106
Weekly hours of formal instruction	3.186	0.075
Number of books published	6.229	0.013
Number of articles published	0.458	0.499
Main Effects		
Inbreeding	0.214	0.644
Females (n=73)		
Covariates		
Weekly hours of administration	0.019	0.890
Weekly hours of formal instruction	0.005	0.942
Number of books published	0.981	0.326
Number of articles published	0.259	0.612
Main Effects		
Inbreeding	4.518	0.037

tivity variables is significantly related to time to promotion for males, none are for females. The mean time to promotion to associate professor is 7.62 years for inbred women and 5.60 years for noninbred women.

Statistical Hypothesis Four

Statistical hypotheses 4a and 4b examine the same basic relationship as the two previous hypotheses, with the subject group changed to full professors and the time variable measured as years to promotion to that rank:

H_{4a} -- there is no difference in years served prior to promotion to full professor between inbred and noninbred male faculty of that rank,

H_{4b} -- there is no difference in years served prior to promotion to full professor between inbred and noninbred female faculty of that rank.

One-way analysis of covariance was again used to test this relationship. The subjects included all full professors holding academic doctoral degrees teaching at research or doctoral granting universities. The four covariates used to test Hypotheses 3a and 3b were used in these analyses as these general criteria for promotion apply regardless of the rank.

The results (shown in Table 16) indicate that the main effect,

Insert Table 16 About Here

TABLE 16
ANALYSIS OF COVARIANCE RESULTS FOR YEARS SERVED
PRIOR TO PROMOTION TO FULL PROFESSOR

Source of Variation	F Value	F Significance
Males (n=953)		
Covariates		
Weekly hours of administration	0.690	0.406
Weekly hours of formal instruction	2.051	0.152
Number of books published	9.942	0.002
Number of articles published	19.040	0.000
Main Effects		
Inbreeding	0.988	0.318
Females (n=79)		
Covariates		
Weekly hours of administration	0.960	0.330
Weekly hours of formal instruction	0.015	0.902
Number of books published	1.075	0.303
Number of articles published	1.606	0.209
Main Effects		
Inbreeding	0.008	0.929

inbreeding, was not significantly related to years served prior to promotion to full professor for either males or females. The null hypothesis cannot be rejected. As with the results for time to associate, there are productivity variables which are significant for males, but there are none which are significant for females. It is interesting to note that the average time to full professor is slightly less for inbreds of both sexes.

Statistical Hypothesis Five

The relationship between rank and institution origin is examined in hypotheses 5a and 5b:

H_{5a} -- There is no difference in the distribution of ranks between inbred and noninbred male faculty.

H_{5b} -- there is no difference in the distribution of ranks between inbred and noninbred female faculty.

As the results in Table 17 show, the Chi-square statistic is

Insert Table 17 About Here

significant for male faculty, but not significant for female faculty. The null hypothesis of no relationship between origin and distribution of ranks is rejected for men only. The extension of the analysis to an examination of the percentage of inbred and noninbred males does not reveal a clear direct or inverse relationship between inbreeding and rank. The percent of inbred faculty at the instructor, full professor, and distinguished pro-

TABLE 17

CHI-SQUARE RESULTS FOR FACULTY IN RANK BY INSTITUTIONAL ORIGIN

Rank	ORIGIN	
	Inbred	Outbred
Males		
Distinguished Professor	13	44
Full Professor	143	894
Associate Professor	63	594
Assistant Professor	50	436
Instructor	7	13
Chi-Square		23.929
Significance		0.000
Females		
Distinguished Professor	0	0
Full Professor	12	72
Associate Professor	17	67
Assistant Professor	20	112
Instructor	1	5
Chi-Square		1.329
Significance		0.722

fessor ranks are greater than the percent of noninbred faculty at these ranks.

Statistical Hypothesis Six

Statistical hypotheses 6a and 6b are analogous to hypotheses 3 and 4 in that they measure time to receipt of an institutional reward -- in this case tenure:

H_{6a} -- there is no difference in the years served prior to receipt of tenure between inbred and noninbred male faculty.

H_{6b} -- there is no difference in the years served prior to receipt of tenure between inbred and noninbred female faculty.

As with the third and fourth hypotheses, analysis of covariance was used to test hypotheses 6a and 6b. Because of the similarity in the criteria for the promotion and tenure decisions, the same four institutional productivity variables were used as covariates. Only tenured faculty at research or doctoral granting institutions with academic doctorates were included in this analysis.

The effect of inbreeding is not significant for either males or females (see Table 18). The only F-ratio that is significant

Insert Table 18 About Here

in this analysis is the relationship of the number of books produced to years to tenure for male faculty.

Statistical Hypothesis Seven

The existence of wage discrimination in the compensation of

TABLE 18
ANALYSIS OF COVARIANCE RESULTS
FOR YEARS SERVED PRIOR TO THE RECEIPT OF TENURE

Source of Variation	F Value	Significance
Males (n=1593)		
Covariates		
Weekly hours of administration	0.655	0.419
Weekly hours of formal instruction	0.100	0.751
Number of books published	14.498	0.000
Number of articles published	2.555	0.110
Main Effect		
Inbreeding	2.309	0.129
Females (n=156)		
Covariates		
Weekly hours of administration	1.321	0.244
Weekly hours of formal instruction	0.246	0.621
Number of books published	0.218	0.642
Number of articles published	0.004	0.953
Main Effect		
Inbreeding	0.203	0.653

inbred faculty is considered in the single seventh statistical hypothesis:

H_7 -- there is no difference in institutional rewards between inbred and noninbred faculty.

Unlike the preceeding five hypotheses, the seventh is not written separately for female and male faculty because the regression methodology conveniently allows the inclusion of sex as a dummy independent variable.

The testing of this hypothesis involved three distinct steps: the development of a model of the salaries of noninbred faculty through the use of regression analysis; the use of this model to predict the salaries of inbred faculty; and the determination of the significance of the difference between the predicted and actual salaries for the inbred faculty.

A regression model was developed using the Statistical Analysis System (SAS Institute, 1979) for the 2323 noninbred faculty holding academic doctorates and teaching at research and doctoral granting universities. The independent variables were selected according to impact on salary. Most of the variables are standard effort and productivity measures. Several, however, require more explanation. Two, race and sex, are not legitimate salary determinants. Nevertheless, it was felt that they were likely to have a significant impact on the existing pattern of remuneration and consequently they were included in the analysis. The size of the

coefficients for these variables (both were significant at the $p < .05$ level) indicate that the a priori assumptions about their importance were justified. Age and experience appear as squared variables because the compounding nature of salary increments often leads to a curvilinear relationship with time variables. A final non-productivity variable was a measure of the prestige of the institution with lower numbers representing higher prestige. The coefficients for the variables, the intercept, and the percent of variance explained are shown in Table 19.

Insert Table 19 About Here

Values for the independent variables for each of the 353 inbred faculty were multiplied by the coefficients obtained in the previous step, resulting in a predicted salary for each inbred subject. This figure represents the amount the people would have earned if they had been rewarded for their efforts, productivity, and other characteristics as noninbred faculty were compensated. A residual value for each subject was calculated by subtracting the actual salary from the predicted amount.

The mean of the distribution of residuals was \$426, indicating that the inbred faculty were paid, on the average, \$426 less than noninbred faculty with equivalent attributes. A t-statistic was computed to test the hypothesis that the mean of the population equalled zero. The t-value (1.86) is significant at the

TABLE 19
RESULTS OF THE REGRESSION ANALYSIS FOR HYPOTHESIS 7

Independent Variables	Coefficient
Books	
none	-801
1-2	-353
3-4	919
5-10	1702
more than 10	1821
Articles	
none	-5388
1-2	-4976
3-4	-4465
5-10	-4482
11-20	-3039
21-30	-1945
31-50	-1304
more than 50	699
Weekly Hours of Teaching	
none	1193
1-4	547
5-6	177
7-8	-288
9-10	-342
11-12	-118
13-16	-1200
17-20	-2649
more than 20	-1068
Weekly Hours of Research and Scholarly Writing	
none	-500
1-4	-282
5-8	-319
9-16	-40
17-34	191
more than 34	-381

Weekly Hours of Counseling Students

none	349
1-4	35
5-8	2
9-16	-332
17-34	-771
more than 34	-4310

Weekly Hours of Administration

none	-34
1-4	122
5-8	672
9-16	791
17-34	3281
more than 34	4016

Sex	814
-----	-----

Race	761
------	-----

Field

Social Sciences	59
Humanities and Fine Arts	-1413
Natural Sciences	-557
Applied Professional fields	885

Experience	454
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Experience squared	-5
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Age squared	0
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Prestige	-95
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Other results

Intercept	\$19,216
-----------	----------

Adjusted R^2	.59
----------------	-----

$p < .05$ level, indicating that the null hypothesis (that the mean equals zero) was rejected.

Discussion

The results of the three analyses for the first statistical hypothesis (summarized in Figure 5) support the rejection of the

Insert Figure 5 About Here

null hypothesis. All four related tests of the D^2 statistic were significant at least at the $p < .01$ level. Regardless of which set of variables was included, significant differences between inbred women and inbred men were found. The variables which were significant in the analyses, when combined with information provided by the means of the male and female groups on those variables (shown in Table 20), provided insight into the nature of

Insert Table 20 About Here

the differences between the groups.

In the overall analysis (1), the standardized discriminant coefficients indicated that the rate of production for total books adjusted for effort had the highest relative contribution to the discriminant function. An examination of the means for this variable indicated a higher productivity for women than for men.

The next highest coefficient was computed for the production of books in the last 2 years, adjusted by effort. The means on

Figure 5: Summary of Results for Hypothesis One

Analysis Number	Variables Included	D ² Significance Level	Null Rejected
One	All productivity	.001	Yes
Two a	Output (adjusted for experience and effort)	.001	Yes
Two b	Output (adjusted for experience only)	.001	Yes
Three	Effort	.01	Yes

TABLE 20
MEANS BY SEX FOR VARIABLES IN DISCRIMINANT FUNCTIONS

Variable	Males	Females
Weekly Hours of Teaching	2.83	2.94
Weekly Hours of Administration	2.79	2.64
Weekly Hours of Formal Instruction	3.38	3.40
Above Salary Earnings	3.23	2.46
Receipt of Research Funding (last year) ^a	1.38	1.64
Service as a Paid Consultant (last 2 years) ^a	1.32	1.33
Research: Applied ^a	1.17	1.30
Research: Policy-oriented ^a	1.56	1.54
Articles: Rate of Production Adjusted by Effort (AREF)	0.15	0.17
Books: Rate of Production Adjusted by Effort (BREF)	0.07	0.10
Articles: Last Two Years Productivity Adjusted by Effort (A2EF)	2.13	2.62
Books: Last Two Years Productivity Adjusted by Effort (B2EF)	1.61	1.41
Other Writings: Last Two Years Productivity Adjusted by Effort (O2EF)	2.00	2.04
Books: Overall Productivity Adjusted for Experience (BRATE)	0.21	0.26

^a Binary variables coded Yes = 1 and No = 2

this variable indicated that male inbred faculty had produced more books in the last two years per unit of effort. Males were also more likely to have received research funding in the last twelve months (the third variable in terms of importance) and had higher percentages of above salary earnings (the fifth variable).

The means of the fourth and sixth variables (in terms of coefficient size), rate of total article production adjusted by effort (AREF), and production of articles in the last two years adjusted by effort (A2EF), showed greater productivity by women. On other significant variables, women did more formal instruction while men did more administration and were more likely to have served as a paid consultant.

The overall pattern shown in the results of the first discriminant analysis was that women show higher performance in the traditional institutional areas while men seem to emphasize external pursuits. Women had higher productivity for both article categories and one of the two book categories. They also spent more time in formal instruction. The male orientation toward external activities was demonstrated in higher above salary earnings and higher probabilities for the receipt of research funding and appointment as a paid consultant.

The analyses of the first statistical hypothesis using only productivity variables (2a and 2b) show much the same results as the overall analysis (1). Where the variables are adjusted for

both experience and effort (2a), overall book productivity is again the most heavily weighted variable. It is followed by two-year article productivity and two-year book productivity. Six of the nine possible variables are included in the discriminant function. The three excluded items are binary variables reflecting receipt of research funding and work as a paid consultant.

Only two of the nine variables available in the analysis of productivity adjusted for experience (2b) were included in the final solution. Receipt of research funding in the last year and the number of books produced adjusted for years of experience were the only variables in the function.

The third analysis included only variables reflecting effort. Above salary earnings and weekly hours of teaching appeared in the final discriminant function. Examination of the means on these variables indicate that men have higher above salary earnings and women spend more time in the classroom.

The results of the analyses for statistical hypothesis two (summarized with the results for hypotheses 3 through 6) in Figure 6 indicated that there was a significant difference in retention

Insert Figure 6

rates for both sexes when ten one-year cohorts are studied together. The distribution of faculty indicated that it was more likely that an inbred subject would stay at the first position.

Figure 6

Summary of the Results for Statistical Hypotheses 2 through 6

Hypothesis Number	Dependent Variable	Sex	Statistical Test	Null Rejected
2a	Longevity at first position	Male	Chi-square	yes
2b	Longevity at first position	Female	Chi-square	yes
3a	Years to promotion (Associate)	Male	Analysis of Covariance	no
3b	Years to promotion (Associate)	Female	Analysis of Covariance	yes
4a	Years to promotion (Full)	Male	Analysis of Covariance	no
4b	Years to promotion (Full)	Female	Analysis of Covariance	no
5a	Rank	Male	Chi-square	yes
5b	Rank	Female	Chi-square	no
6a	Years to tenure	Male	Analysis of Covariance	no
6b	Years to tenure	Female	Analysis of Covariance	no

Initially this seemed contrary to the usual concern that inbred faculty are terminated solely because of their institutional origin. In fact, a critical variable was missing from the analysis -- the individual's aspirations for mobility. Calculations based on the number of faculty who have not moved are biased by the potentially higher propensity toward mobility of noninbred faculty.

A narrower interpretation of the question, differentiating between voluntary and involuntary mobility, would have provided more insight into the treatment of inbred faculty. For example, an hypothesis about the relative frequency of involuntary termination would better serve the purpose of identifying differences in retention policy. Unfortunately, the 1977 Survey data could not support this type of analysis.

Beyond the first year, a higher percentage of inbred faculty were in the first job. If the cross-sectional results over ten cohorts do reflect trends, it is more likely that inbreds are immobile over time. As such, they are a potential model for all immobile faculty.

The analyses for hypotheses 3 and 4 included two significant improvements over most earlier efforts to evaluate the effects of institutional origin. First, a more precise definition of the dependent variable was used. As the time to promotion was measured from the start of the first full-time teaching position, the confounding effect of the inclusion of service as a research

or teaching assistant was avoided. Second, through the sample selection and the inclusion of covariates in the analyses, a significant amount of irrelevant variation was removed from the final test for the significance of the main effect. Only faculty with doctoral degrees were included in the analysis and the primary institutional productivity variables were used as covariates.

Only one of the analyses for the third and fourth statistical hypotheses yielded significant results. For female associate professors, inbreeding was significantly related to the time served prior to promotion to that rank. The mean time to associate was greater for inbred than noninbred women. These results indicate that inbreeding is a handicap in a critical career movement for women, but not for men.

As there were only eleven inbred female full professors included in the analysis for hypothesis 4b, it is probable that the lack of significance may reflect the insufficient cell size. It may also be the case that the promotion to associate is the significant hurdle in the career stream for women and once that obstacle is passed, the later decisions are not influenced by institutional origin.

Another interesting result from these analyses was found in the impact of the institutionally-based productivity measures used for covariates. For men at both ranks at least one of the covariates had a statistically significant relationship with the depen-

dent variable. At least in some ways time to promotion for males is related to productivity. For females, on the other hand, none of the covariates was significant at either rank. With the exception of the significant result for the main effects for female associate professors noted above, there was no significant systematic relationship between time to promotion for women and any of the variables. The lack of an apparent relationship between the productivity variables and time to promotion for women is disturbing. Since it appears that the time is determined by variables other than these important measures of productivity. One possible conclusion is that the time to promotion is capriciously determined. As not all legitimate predictors have been included as covariates in these analyses, this conclusion cannot be substantiated. It is, however, suspicious that none of the covariates was significant.

The analyses for the fifth hypothesis found that the distribution of ranks was significantly different between inbred and non-inbred males. Examination of the distribution of ranks for the two male groups revealed that inbred faculty were concentrated at the lowest (instructor) rank and the two highest ranks (full and distinguished professor). This distribution supports a bimodal theory of inbred performance. If males are inbred either because they are at the top or the bottom of their peer groups, the result would be high concentrations at the highest and lowest ranks. The

competent group would progress rapidly to full or distinguished professor, and the bottom group would be used and then terminated prior to promotion into the mainstream of the faculty ranks.

There is also a possibility of a confounding effect due to length of service in this type of cross-sectional analysis. Faculty who are now full professors passed the critical career barriers of promotion and tenure in earlier years. The earlier these decisions were made, the greater the market pressure to keep a faculty member. The higher percentage of inbreds in the top ranks may reflect the lower institutional power in the job marketplace at the time of promotion. It would have been easier to enforce any inbreeding prohibitions as the labor markets tightened providing more applicants for each job.

In the analysis of the distribution of ranks for women in hypothesis 5b, the null was not rejected. It is interesting to observe, in comparing the results for hypothesis 5a to those for 5b, that there was a much larger concentration of women than men at assistant professor and that there were no female distinguished professors.

The analysis of time to tenure for hypothesis 6 resulted in no significant results for the main effect, inbreeding. Given the rigidity of most faculty regulations about the granting of tenure, these results were reasonable. It was mildly surprising to note that any variable was significant. For males, production

of books was significantly related to time served prior to the receipt of tenure.

The first step in the analysis for the seventh hypothesis was the derivation of an equation for the determination of salaries for the noninbred faculty. The coefficients in this equation indicated the relative rewards to the various activities included as independent variables. Examination of the coefficients provided some interesting information about the reward structure in higher education.

Higher returns were given to those who produce more books and more articles, and who did more administrative work. In general, lower rewards were given for larger commitments to teaching and counseling students. The coefficients for time spent in research were ambiguous. The lack of a constant relationship between time spent in research and rewards, and the increasing returns for higher levels of book and article productivity probably reflects the fact that research rewards are based primarily on output and not on effort.

The variables reflecting characteristics, not activities, also provided insight into the salary structure. The highest field coefficient was for applied professional subjects with the social sciences, natural sciences, and humanities and fine arts following in order of decreasing coefficients. The values for sex and race indicated that premiums were paid for males and non-

caucasians. The intercept for the regression equation was \$19,216. The results indicated that the equation accounted for 59 percent of the variance in the salaries. This value is within the range of R squares reported in other salary equity studies. Therefore, it can be reasonably concluded that this regression equation is sufficiently accurate for the determination of salary equity.

The analysis for the seventh hypothesis continued with the use of the regression equation to predict salaries for the inbred subjects. The t-test performed on the differences between the predicted and actual salaries indicated that the mean of the population was significantly different than zero. As the residual between the predicted and actual salaries impounded any variation not resulting from the independent variables, the interpretation of the results depended on the completeness of the list predictor variables. As the independent variables used in this analysis included all generally-accepted legitimate salary determinants as well as sex and race (the two primary discriminatory factors), it was reasonable to assume that the residuals were the result of institutional origin. The mean of the residuals indicated that inbred faculty were paid \$426 less, on the average, than noninbred faculty of equivalent characteristics.

To better understand the magnitude of this difference it is useful to compare it to the salary levels of faculty members. To do so required the development of a hypothetical faculty member.

This person was assumed to be a white male, teaching in the humanities, with one or two books and three or four articles. Each week he spends nine to ten hours teaching, nine to sixteen hours on research, one to four hours counseling students, and five to eight hours in administration. It was also assumed that he has four years of experience and teaches at an institution at the highest prestige level and that he is inbred.

Application of the regression model to this hypothetical individual yielded a salary of \$14,094. The \$426 difference was approximately 3% of the computed salary. Although the recent high rates of inflation make this seem like a small difference, it was statistically significant and would certainly have been material to the recipient.

Summary

The results of this research indicated that inbred women can be differentiated from inbred men. All of the discriminant analyses were significant at least at the $p < .01$ level. Differences on the means of the variables indicated that women were more involved in teaching and other traditional activities and that men were more productive on external factors.

The analysis of the relative treatment of inbred faculty on professional advancement variables found only four significant results. Regardless of sex, inbred faculty were more likely to be in their first position. Inbred men were concentrated in high

and low ranks and inbred women served more time prior to promotion to associate.

The use of a regression model based on noninbred faculty to predict the salaries of inbred faculty indicated a premium was paid for noninbred status. The difference was statistically significant at the $p < .05$ level.

Chapter 5

INSTITUTIONAL ORIGIN AND LABOR MARKET POLICY

The origin of this research study was in an interest in the operation of the academic marketplace. The goal was not to provide an esoteric analysis, but rather to expand the knowledge of the labor market in a manner which would provide results which would be of use to participants in the marketplace. However, certain definitional and methodological advances were included. In this research, the standard definition of productivity was expanded and multivariate analyses were used. These technical contributions are discussed in the first section of this chapter and the limitations of the study are covered in the second section. The final sections review the results of the research and the implications of these results for institutional policy.

Technical Advancements

Most research on academic productivity utilizes definitions which are based only on research activities. Commonly-used variables include the number of articles and the number of books written. This research included information on teaching, administration, acquisition of research grants, work as a consultant, and type of research undertaken. It was felt that the standard research-based definition of productivity did not properly reflect the variety of value-producing activities routinely undertaken by

faculty members.

In addition to expanding the number of activities, several of the analyses included an adjustment to the book, article, and other writing variables for the amount of time spent on research each week. This provided for a further inclusion of the task mix in the determination of productivity.

The present research also used an hypothesis testing addition to the standard regression methodology for salary discrimination. The use of a t-test on the residuals of the comparison of predicted and actual salaries for the unfavored group allows the determination of the statistical significance of discriminations.

Limitations

No analysis can be better than the data used as input. The 1977 Survey provided primarily cross-sectional data with some indicators of longitudinal data, such as times of promotion and years in higher education. Longitudinal data would probably have given a better view of the academic production and reward processes. However, such data was not readily available and its acquisition for such a large sample was virtually impossible.

Another limitation of the data was its source. The 1977 Survey data was collected directly from the subjects. Although self-reported data is generally suspect, Allison and Stewart (1974) found a correlation of .94 between self-reported number of publications and results from a survey of abstracts. As there is no

reason to believe that the propensity to give false data was greater for any group of interest in this research, the potential self-report bias was not judged to be a severe problem.

A final limitation of the study involved the number of subjects. With only fifty inbred women, the results, especially where only part of the pool was included may have been influenced by the small number of subjects. This effect was most probable in the analysis for statistical hypothesis 4b. There were only eleven female, inbred full professors. It was, however, unrealistic to conclude that the small number of female inbred faculty is due to sampling errors. Given the low percentages of women and inbred faculty, the small number of people meeting both these criteria was realistic.

The Treatment of Inbred Faculty

One of the objectives of this research was to expand the knowledge of the labor market in a way which would yield results valuable to participants in the marketplace. With this goal in mind, it is reasonable to reverse the order of the research hypotheses and first ask if there is discrimination against inbred faculty.

The review of the literature in chapter two showed that the one idea that all of the studies agreed on was the undesirability of inbreeding. The pessimism reflected in Eliot's (1908) early warning pervades the literature. Regardless of whether studies

were designed to support or refute the thesis that inbred faculty are less productive, the underlying assumption was that the phenomenon has a negative impact.

The opportunity for the distaste against inbreeding to be acted upon in the form of discrimination has certainly existed in both the internal and external academic labor markets. As early as 1935, the potential for differential treatment was recognized in the literature. Eells and Cleveland (1935a) speculated that inbred faculty were hired as a matter of economy. McGee (1960) argued that universities manipulated the demands on and rewards to inbred faculty to allow surplus resources to be diverted for non-inbred faculty. The question of the existence of discrimination against inbred faculty was addressed in the second and third hypotheses. The former considered bias in decisions concerning professional advancement; the latter examined the distribution of institutional rewards.

Research hypotheses two through six were designed to test for discrimination in the major categories reflecting professional advancement: retention in the first position, years to promotion (both to associate and to full professor), rank, and years to acquisition of tenure. All of these measures of professional advancement were under the control of the university and, therefore, potentially subject to bias based on institutional origin.

The only analysis in the present study which clearly indicated the existence of discrimination against inbred faculty was the examination of time to promotion to the rank of associate professor for female faculty (statistical hypothesis 3b). The main effect, inbreeding, was found to be statistically significant while the effects of the productivity covariates were not. Inbred women served longer periods of time before promotion to associate than noninbred women and the difference cannot be explained by major productivity factors. Although this result reflected only one measure of professional advancement, its effects should not be minimized. Promotion to associate is a critical step in the professional career path and one which might, in itself, influence later decisions.

The result of the analysis of the distribution of ranks among inbred and outbred male faculty was also significant. However, the interpretation of the results was more difficult and a clear judgement of discrimination against inbred faculty could not be substantiated. A higher concentration of inbred faculty was found at the rank of instructor -- a result which would indicate bias. But higher concentrations of inbreds were also found at the two highest ranks -- a result which was contrary to the notion of discrimination. Without further analysis to explain the bimodal nature of the relative distribution, the significant results cannot be used to demonstrate discrimination.

Stronger evidence, both in terms of results and methodology, indicating the existence of bias against inbred faculty was found in the examination of institutional rewards. Testing for the differences in compensation is a difficult problem because of the large number of variables which impact on the determination of rewards. Multiple regression analysis has become the technique of choice for the modeling of salaries because of its capacity to include the variance from many characteristics through their inclusion as independent variables. This type of analysis is methodologically stronger than the comparison of means which was used in previous inbreeding studies.

The results of the analysis on institutional rewards indicated that there were significant differences in compensation based on institutional origin. Further examination of the data revealed that inbred faculty were paid on the average significantly less than noninbred faculty of equivalent characteristics.

Armed with the results of the second and third research hypotheses which indicate that some discrimination against inbred faculty existed, especially in the critical area of monetary compensation, it would seem reasonable to move on to a prescription for the abandonment of prohibitions and biases against inbred faculty. However, it is first useful to return to the major research hypothesis and ask whether inbred women are different than inbred men. The context for answering this question is the

economic theory based on job market signaling behavior which was used to guide this research.

The Performance of Male and Female Inbred Faculty

As explained in chapter 1, the job market (internal or external) uses signals, given by prospective employees, to evaluate potential productivity. The employer tailors the conditions of the employment offer, and possibly the very fact of the offer itself, according to the productivity expected from the individual job seeker. The greater the correspondence between the signals given by the prospective employees and their later productivity, the greater the efficiency of the labor market. The mechanism which facilitates the extension of signals by job seekers is the cost of signaling. The information-based models of the labor market normally assume equal signaling costs across all job seekers.

The assumption of equal signaling costs is not appropriate when analyzing the impact of institutional origin in the academic marketplace. Because of often limited geographic mobility due to personal concerns, women may experience a higher cost to signal outbred than men. As a result, women who are in fact highly productive may give the low productivity signal (inbred). If it is then assumed that they must be low producers because they are inbred, the market is discriminating against the highly productive women by using a signal which does not reflect reality.

The important question is whether inbred women are indeed

different than inbred men and whether the differences indicate higher productivity. The analyses for the first statistical hypothesis were directed at determining if significant differences exist between male and female inbred faculty. The results indicated that significant differences do exist. Further examination of the data indicated that women show higher performance in most traditional institutional areas while men seem to emphasize external activities. Women had higher productivity for both article categories and one of the two book categories used in the study. They also spent more time in formal instruction. The male orientation toward external activities was demonstrated in higher above salary earnings and higher probabilities for the receipt of research funding and appointment as a paid consultant. To the extent that institutions favor traditional teaching and research services over those activities which benefit external parties, women should receive higher institutional rewards.

Implications

This research has shown that inbreeding is a signal which is treated negatively in the academic labor market. There is negative treatment in reward decisions and to a lesser extent in measures of professional advancement. The negative valence attached to inbreeding indicates that it is assumed to be a signal of low productivity. While previous studies have indicated that inbreeding is, in fact, an indicator of lowered productivity, none of

these studies has taken into account the possible differences between male and female inbred faculty. Significantly, the results of this study indicate that inbred women are more productive in institutional services than inbred men.

As the results of this research indicated that inbred women are significantly different than inbred men, a recommendation of differential treatment seems to be in order. Even if the inbreeding signal has worked correctly for males, there is reason now to question its applicability to women. Although further research on the relationship between inbreeding and productivity is needed to determine whether the signal is properly applied to males, it is in the interest of market efficiency to argue for the abandonment of inbreeding as a signal altogether because it is no longer suitably reliable as an indicator of productivity across all applicants. The cost of defending and maintaining a rule used only for one sex would not be balanced by the gains from the use of such a rule. Individual promotion and retention decisions should be based on the characteristics actually exhibited by the person being evaluated and not on the surrogate of institutional origin.

APPENDIX A

Questionnaire Items by Variable Category

I. Inbreeding

32. Please list (beginning with the most recent) the academic degrees which you have been awarded, the institution granting each, and the year in which each was obtained.

Degree	Institution	Year
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

34. At how many colleges or universities have you been employed *full-time* (beyond the level of teaching or research assistant)?

Only this one.....	Five.....
Two.....	Six.....
Three.....	Seven or more.....
Four.....	

II. Research Productivity

A. Journal Articles

48. How many articles have you published in academic or professional journals?

None.....	11-20.....
1-2.....	21-30.....
3-4.....	31-50.....
5-10.....	More than 50.....

49. How many of your professional writings have been published or accepted for publication in the last two years?

One.....	Five.....
Two.....	Six-ten.....
Three.....	More than ten.....
Four.....	None.....

B. Books or Monographs

47. How many books or monographs have you published or edited, alone or in collaboration?

None.....	5-10.....
1-2.....	More than 10.....
3-4.....	

See also Question 41 (supra)

C. Research Findings

50. Have you ever received research funding from any source?

Yes.....	No.....
----------	---------

51. In the past 12 months, have you received any?

Yes.....	No.....
----------	---------

52. [IF YES] from which of the following did you receive funding? (Mark all that apply)

	Past 12
Ever	Months

- a. Institutional or departmental funds...
- b. Federal agencies.....
- c. State or local government agencies....
- d. Private foundations.....
- e. Private industry.....

III. Prestige

71. Within the past two years, have you received an offer of another job or a serious inquiry about your availability for another position?

An offer.....
Not an offer, but a serious inquiry.....
Neither.....

72. Within the past two years, have you sought, or made a serious inquiry about another position?

Sought another position.....
Not sought, but made a serious inquiry.....
Neither.....

79. Comparing yourself with other academic persons of your age and qualifications, how successful do you consider yourself in your career?

Very successful.....

Fairly unsuccessful...

Fairly successful....

Very unsuccessful.....

IV. Other Descriptive Variables

Teaching effort

42. During the current term, how many hours per week are you spending in formal instruction in class? (If on leave, indicate what your normal teaching load would be.)

None.....	11-12.....
1-4.....	13-16.....
5-6.....	17-20.....
7-8.....	21 or more.
9-10.....	

41. During the present term, how many hours per week, on the average, are you actually spending in connection with your staff position in each of the following activities:

	None	1-4	5-8	9-16	17-34	35 or More
a. Administration.....						
b. Scheduled teaching (actual hours).....						
c. Preparing for teaching (including reading papers, grading).....						
d. Advising and counseling students.....						
e. Research and scholarly writing.....						

Consulting

53. Have you ever served as a paid consultant?

Yes.....	No.....
----------	---------

54. In the past two years have you served in such a capacity?

Yes.....	No.....
----------	---------

55. [IF YES] To which of the following have you served?
(Mark all that apply)

Ever Past Two Years

- a. Local business.....
- b. Local government or school...
- c. National corporation.....
- d. Federal government.....
- e. Other.....

Role Description

56. Some faculty members are inclined to think of themselves as "intellectuals." Others find "scholar," "scientist," "teacher," or "professional" more satisfactory descriptors. Which of these terms describes you best? Which is the poorest descriptor?

a. Best b. Poorest

- Intellectual.....
- Professional.....
- Scholar.....
- Scientist.....
- Teacher.....

57. Do your interests lie primarily in research or in teaching?

- Very heavily in research.....
- In both, but leaning toward research...
- In both, but leaning toward teaching...
- Very heavily in teaching.....

See also Question 41 (supra).

58. Would you characterize your recent scholarship, research, or creative writing as:

Yes No

- a. Pure or basic.....
- b. Applied.....
- c. Policy oriented.....
- d. Literary or expressive.....

59. In many disciplines, faculty members differ in seeing their work as primarily in the area of theory, or as largely substantive or experimental. Is your work:

- Largely theoretical.....
- Largely substantive or experimental.....
- The distinction is not applicable in my discipline...

V. Compensation

43. What is your basic institutional salary, before taxes and deductions, for the current academic year?

Below \$10,000.....	\$25,000-\$29,999.....
\$10,000-\$11,999.....	\$30,000-\$34,999.....
\$12,000-\$13,999.....	\$35,000-\$39,999.....
\$14,000-\$16,999.....	\$40,000-\$44,999.....
\$17,000-\$19,999.....	\$45,000-\$49,999.....
\$20,000-\$24,999.....	\$50,000 and over....

44. Is this based on

9/10 months.....	11/12 months.....
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45. In recent years, roughly how much have you earned over and above your basic salary? (Please estimate as a percentage of your basic salary.)

0%.....	30%-39%.....
Under 10%.....	40%-49%.....
10%-19%.....	50% and over...
20%-29%.....	

VI. Demographics

Rank

38. What is your present rank?

Instructor.....	Distinguished/"Named"
Assistant Professor....	Professorship.....
Associate Professor....	Lecturer.....
Professor.....	No ranks designated....
	Other.....

35. How long have you been employed on a full-time basis in higher education?...at your present institution? How many years have you held your present rank?

- a. In higher education
b. At your institution
c. In present rank

a b c

0-2 years.....	
3-5 years.....	
6-10 years.....	
11-15 years.....	
16-20 years.....	
More than 20 years.....	

Tenure Status

39. What kind of appointment do you now hold?

Regular with tenure.....	Acting.....
Regular without tenure.....	Visiting.....
Yearly appointment	Other.....
(soft money).....	

40. [IF TENURED] in what year were you awarded tenure?

Field, Sex, Age, & Race

46. From the following list, mark one subject in each column; mark the most appropriate fine categories, if applicable; where your precise field does not appear, mark the most similar category.

- a. Highest postgraduate degree
- b. School, division, or department where principal appointment is held
- c. Present principal teaching field
- d. Present primary field of research, scholarship, creativity

108. Your sex:

Female..... Male.....

109. How old are you? _____

112. Your race:

Black/Negro/Afro-American.....
 White/Caucasian.....
 Oriental.....
 Other.....

106. What is your marital status?

Never married.....
 Married, living with spouse.....
 Married, separated from spouse.....
 Divorced.....
 Widowed.....

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Vita

Jean Conover Wyer

Birthdate: September 12, 1950

Education: 1967-70 Vassar College
Poughkeepsie, New York
A.B. (Economics)

1972-73 University of North Florida
Jacksonville, Florida
M.B.A.

1973-76 Northwestern University
Evanston, Illinois
C.Phil.

1977-80 The College of William and Mary in Virginia
Williamsburg, Virginia
Certificate of Advanced Study in Education
Doctor of Education

INSTITUTIONAL ORIGIN: LABOR MARKET SIGNALING IN HIGHER EDUCATION

Jean Conover Wyer, Ed.D.

The College of William and Mary in Virginia, August, 1980

Chairman: Dr. Clifton F. Conrad

In response to the need for further research on promotion and tenure decisions, this study examined one of the criteria used in these decisions: inbreeding. Based on an analysis of the academic marketplace modifying Spence's theory of job market signaling behavior, the following research hypotheses guided the study:

1) female inbred faculty have patterns of productivity which are significantly different from the patterns of productivity of male inbred faculty; 2) inbred faculty show less professional advancement than noninbred faculty; and, 3) inbred faculty receive fewer institutional rewards than noninbred faculty.

The data for the research was taken from the 1977 Survey of the American Professoriate. This instrument was designed and implemented under the direction of Everett Carll Ladd, Jr. and Seymour Martin Lipset. Seven statistical hypotheses were tested covering the productivity of male and female inbred faculty, their professional advancement, and their rewards. Methodological factors included a broad operationalization of academic productivity, the use of multivariate analyses, and the inclusion of a test for the statistical significance of discrimination in rewards.

The results of the analyses showed that inbred faculty do experience discrimination in rewards and in some areas of professional advancement. Significant differences were found in the patterns of productivity exhibited by female and male inbred faculty members. Women show higher performance in most traditional institutional areas while men emphasize external activities. The results indicate that institutional origin cannot be used as a reliable signal in the academic labor market.