PAY, RANK, AND GROWING OLD WITH MORE OF EACH

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Factors which comprise the bases for salary increases and adjustments at major research universities have long been topics of conversation and supposition. Based on responses from over 12,000 faculty members, this paper reviews, by faculty rank, items which are likely to contribute to salary and suggests that faculty members can follow certain strategies which are more likely than others to bring a financial reward. Research procedures employed include linear models and multiple regression.

Key words: faculty compensation; faculty rank

When faculty members gather in small groups, one popular conversational topic concerns how to get ahead in academe. Frequently, the only point of agreement among faculty members is that teaching is not recognized as being as important as other activities; for example, see Stableski (1978) or Meeth (1977).

While the process of fixing merit pay raises may appear chaotic, both institutional and national studies have supported the conclusion that criteria for awarding faculty salary increases are reasonably well-defined and explicit.[1] Tuckman and others have used multiple regression of salary on sets of personal and institutional characteristics to establish what are important factors in salary raises (Tuckman, 1976). The results obtained begin to illuminate the weights which are attached to various activities or accomplishments in allocating salary increases (Braskamp and Johnson, 1978). One common finding is that faculty rank is the most important determinant in predicting relative amounts of salary. In such uses rank becomes one of several predictor variables,

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assuming that other determinants of salary have an additive and linear relationship with rank in explaining salary (for example, see Braskamp and Johnson, 1978).

The present study, which develops linear models for each rank, looks at differences which emerge within the various professional ranks at large complex universities. Consequently, it becomes possible to review salary variance at different ranks and to see how different factors influence salary as one climbs the academic ladder.

METHOD

The American Council on Education, as part of its research program, undertook a study of faculty members active in higher education in 1972–73. Although the respondents to the ACE survey numbered over 53,000, the sample for this study is restricted to faculty in major research universities (Carnegie Type 1.1 and 1.2 institutions) who earned between $7,000 and $70,000 as an academic yearly salary. The following professional ranks and respondents are in the sample: 5,128 professors, 3,786 associate professors, and 3,137 assistant professors. The present study builds on earlier work by Tuckman (1976) and by McLaughlin, Smart, and Montgomery (1978).

Within each rank, salary was first regressed on a set of 65 items, and for each rank, items were included which made a significant contribution to explaining salary differences within a rank ($p < .01$). The items retained were then further refined by grouping them into seven categories, which were established in prior research as capable of identifying differences which potentially influence academic salary (McLaughlin, Smart, Montgomery, 1978):

V1 *Geographical Characteristics*
V2 *Institutional Variables*
V3 *Personal Data,* including items on age, degree held, curriculum, and years past degree.
V4 *Scholarly Productivity,* including items on publication and research.
V5 *Institutional Recognition,* including items on tenure, years at current institution, etc.
V6 *Instructional Load,* including items on number and type of students taught.
V7 *Duties,* including time spent on administration, instruction, and research.

It should be observed that the salary figures used are 1972–73 nine-month-equivalent base salary ($1,000s) where all calendar-year salaries are multiplied by 9/11.

In the second phase of the analysis, scores for the seven categories were obtained by multiplying the response on each of the 65 items by its regression weight in the equation and then summing these results for the items in the category. As a consequence, the items within a category can differ for each rank.

The relative importance of each category was then estimated by computing its standardized beta. This step, under assumptions of a causal sequence where variables do not influence lower numbered variables (McLaughlin, Smart, and Montgomery, 1978), allows one to trace the *direct effect* of salary which is related to the seven categories within each rank (Alwin and Hauser, 1975).

RESULTS

The process of sorting out the relative weight of the 65 items studied within each of the seven categories (or variables) and how these variables influenced pay within rank then took place. Table 1 contains the means for all 65 items in the analysis for the three ranks.

The categories (variables) exclude some of the 65 items which do not have a weight in the regression equation.[2]

V1 Geographical Characteristics

The importance of locality and community size on salary is shown in Table 2.

The results show a consistent and significant importance for geographic location. Note in Table 1 that respondents from a region were given a score of 1 for that region and a score of 0 for the other regions. For example, a professor located in the Atlantic region would be expected to earn \$1,979 − \$478, or \$1,501 more than a peer employed in the Great Lakes region. We should note parenthetically that whereas Alaska may have the highest salaries, the few faculty involved were insufficient to influence the results. The difference seems to be a percent of salary (e.g., cost of living) with community size reducing the magnitude of the weights for professors (community size is correlated .19 with Atlantic, −.16 with Great Lakes, and −.39 with Southeast).

V2 Institutional Variables

Type of control (Public = 1, Private = 2) was an institutional variable making a significant contribution to explaining salary. In all cases those in public universities received more money; \$695 for professors, \$733 for associates, and \$395 for assistants.

TABLE 1. Means for Items in Analysis

Professor	Associate Professor	Assistant Professor	
			V1 Geographical Characteristics (yes = 1, no = 0)
.194	.181	.197	*Atlantic States;* Del., Wash. D.C., Maine, Md., Mass., N.H., N.J., N.Y., Pa., R.I., Verm.
.352	.341	.276	*Great Lakes and Plains;* Ill., Ind., Iowa, Kan., Mich., Minn., Mo., Neb., N.D., Ohio, S.D., Wisc.
.174	.234	.284	*Southeast;* Ala., Ark., Fl., Ga., Ky., La., Miss., N.C., S.C., Tenn., Va., W. Va.
	.244	.243	*West and Southwest;* AK, Ariz., Calif., Colo., Ha., Idaho, Mont., Nev., N.M., Ok., Ore., Texas, Utah, Wa., Wy.
3.496	3.228	3.142	*Community Size* (1 = < 30*K*, 2 = 30−100*K*, 3 = 100−400*K*, 4 = 400*K*−1*M*, 5 = > 1*M*)
			V2 Institutional Characteristics
1.976	1.988	1.984	Coeducational (no = 1, yes = 2)
1.247	1.190	1.199	Control (Public = 1, Private = 2)
			V3 Personal Characteristics
1.955	1.905	1.871	Sex (female = 1, male = 2)
52.982	43.502	37.694	Age
2884.4	1968.9	1491.1	Age squared
20.944	10.941	6.298	Years since highest degree
516.603	171.774	80.783	Years since degree squared
.037	.030	.018	Agriculture appointment
.080	.100	.089	Education appointment
.009	.015	.015	Home economics appointment
.215	.221	.292	Humanities appointment
.216	.145	.135	Quantitative & Physical Sciences appointment
.159	.150	.168	Social Science appointment
.010	.011	.013	Architecture appointment
.057	.059	.062	Business appointment
.132	.127	.089	Engineering appointment
.085	.142	.119	Other fields
3.713	3.726	3.642	Degree (1 = less than Bachelors, 2 = Bachelors, 3 = Masters, 4 = Doctors, etc.)

TABLE 1 *(Continued)*

Professor	Associate Professor	Assistant Professor	
			V4 Scholarly Productivity
12.699	9.918	7.738	Publications = Articles (1 = 0, 2 = 1-2, 3 = 3-4, 4 = 5-10, 5 = 11-20, 6 = > 21) + 2 × Books (1 = 0, 2 = 1-2, 3 = 3-4, 4 = 5-10, 5 = > 10) + output in last 2 years (scored as for books)
1.500	1.514	1.545	Research with internal funding (1 = none, 2 = secondary, 3 = principal, 4 = both)
2.094	1.975	1.776	Research with external funding (1 = none, 2 = secondary, 3 = principal, 4 = both)
1.498	1.485	1.488	Recent scholarship/research/writing as Pure
1.446	1.451	1.411	Recent scholarship/research/writing as Applied
1.148	1.132	1.135	Recent scholarship/research/writing as Policy oriented (yes = 2, no = 1)
			V5 Institutional Recognition
16.627	8.674	4.948	Years at current institution
399.036	131.497	46.515	Years at institution squared
9.027	4.705	4.243	Years in Rank
128.270	40.105	24.936	Years in Rank squared
1.578	1.162	1.061	Administrative Responsibilities (1 = none, 2 = Chm, 3 = Dean, 4 = Both)
1.978	1.882	1.197	Tenured
1.269	1.255	1.267	Appointment (1 = AY, 2 = CY)
12.088	4.435	.711	Years tenured
207.176	45.607	7.940	Years tenured squared
			V6 Instructional Load
3.261	3.438	3.676	Number of classes (1 = none, 2 = one, 3 = two, . . . 8 = 7 or more)
2.238	2.555	2.790	Introductory student enrollments (1 = none, 2 = < 10, 3 = 10-25, 4 = 26-49, 5 = 50-99, 6 = 100-249, 7 = 250-399, 8 = 400 or more)
2.605	2.695	2.838	Advanced student enrollments (1 = none . . . 8 = 400 or more) (same as above)
2.371	2.208	2.046	Graduate student enrollments (1 = none . . . 8 = 400 or more) (same as above)

TABLE 1 ***(Continued)***

Professor	Associate Professor	Assistant Professor	
		*V7 Current Time in Activities**	
2.504	2.365	2.127	Administration
3.289	3.515	3.638	Scheduled Teaching
4.097	4.396	4.649	Class Preparation
2.765	2.772	2.726	Advising Students
4.334	4.104	4.038	Research and Writing
		Criterion	
20.389	14.976	12.405	Average 1972-73 Academic Year Salary ($1,000s)

* 1 = none, 2 = 1-4 hours, 3 = 5-8, 4 = 9-12, 5 = 13-16, 6 = 17-20, 7 = 21-34, 8 = 35-44, 9 = 45 or more

TABLE 2. Regression Weights for Geographical Characteristics.

Variable	Professor	Associate	Assistant
Region			
Atlantic	1.979	2.007	1.183
Great Lakes	.478	.584	.483
Southeast	.850	1.032	.656
Community size (1 = small)	.163	—	—

V3 Personal Data

For all three ranks of faculty (see Table 3), both the positive linear and the negative quadratic components of age make significant contributions in explaining salary. This means that the component of salary explained by age increase up to a point (50 to 54 years of age) and then decreases.[3]

In a cross-sectional study such as this one, the results do not imply that in a single case a faculty member's salary declines after a certain age. The results do strongly suggest that by the time a faculty member is past 50 to 54 years of age his relative earning power will be below that of peers unless he has continued to accomplish other things (e.g., increased publications or obtained a grant). The inclusion of the item "years past degree" shifts the maximum relative earning power for faculty to about 59 years of age. In other words, survival is a sufficient condition for an increase (but at a decreasing rate) in relative earning power almost until retirement, all other factors being equal. This ap-

TABLE 3. Regression Weights for Personal Data

Variable	Professor	Associate Professor	Assistant Professor
Age	.518	.151	.179
Age squared	−.0052	−.0014	−.0017
Yrs. past degree	.0918	.1006	.020
Yrs. past degree squared	—	−.0021	—
Completed highest degree	.269	—	.130
Agriculture	−2.449	−1.402	—
Architecture	—	−1.069	—
Business	—	—	.943
Education	−2.104	−1.122	−.401
Engineering	−.438	—	—
Home Economics	−1.887	—	—
Humanities	−.925	−1.426	−1.194
Quantitative & Physical Sci.	−.959	−.843	—
Social Sciences	−.644	−.938	—
Sex (Male = 2, Female = 1)	1.297	.691	.975

parent conclusion, however, can be modified as the factors in variable V5 are considered, that is, years in rank or years past tenure.

The interpretation of results for those working in different curricular fields is more complex. Several results appear to be consistent over the three groups; for example, faculty in business consistently obtain higher salaries than their peers in other disciplines while faculty in humanities and education consistently are paid less, other things being equal. The data do not mean that professors in education are paid $2,104 less than professors in business, but they imply that if two professors are paid the same it can be explained by the fact that the professor in education is older, has published more, has had external funding for research, or has some other attribute compensating for the difference expected based on curricula.

V4 Scholarly Production

While a strong publication effort is important at all three ranks, it is almost three times as important at the professorial rank (see Table 4). In addition, the current salary system shifts the senior faculty member's attention from research funded with internal money to research funded from external money. The type of research is also important. While junior faculty are rewarded more for engaging in applied research, as a faculty member advances in rank the value of applied research (for salary purposes) decreases and the relative importance of

TABLE 4. Regression Weights for Scholarly Production

Variable	Professor	Assoc. Prof.	Asst. Prof.
Publications	.207	.074	.071
Internal funded research	—	—	.090
External funded research	.488	.110	—
Type of scholarship research			
Applied	—	.237	.400
Policy	.297	.385	.223

"policy" research increases.[4] The incremental expected salary from applied research drops from $400 to $237 to 0 as one moves from assistant professor to the rank of professor. For a faculty member who seeks to maximize salary, the strategy would be initially to undertake departmental projects and applied programs and later to seek external funds and move toward "policy" research.

V5 Institutional Recognition

Based on years at an institution, time in rank, and years tenured, the relative salary of professors and associate professors who remain in the same institution increases up to a point and then begins to drop (see Table 5.). For typical professors this point is 28 years after they become a professor at the institution (if they are still alive and working).

The maximum contribution of these factors to salary comes after seven years in the rank of associate professor for the *typical* faculty member, who incidentally has had about four years experience at the same institution prior to promotion. The maximum expected relative

TABLE 5. Regression Weights for Institutional Recognition

Variable	Professor	Assoc. Prof.	Asst. Prof.
Yrs. at current institution	−.211	−.078	—
Yrs. squared	.0030	.0013	—
Yrs. in rank at current inst.	.409	.256	.136
Yrs. in rank squared	−.0073	−.0090	−.0059
Administrative Responsibility	.508	—	—
Yrs. tenured	—	−.109	−.164
Yrs. tenured squared	—	.0020	.0064
Appointment (1 = Ay, 2 = Cy)	−1.710	−1.064	−1.156

salary for the typical assistant professor is the time just before receiving tenure.[5] This finding appears to occur because of the large negative weight on the linear component of years tenured.

Based on these weights, decision analysis can be used to determine the economic advantages to various strategies such as moving from one institution to another. For example, given seven years at an institution prior to promotion to professor, the incremental contribution based on the experience factors in V5 for the faculty member who stays is:

$$I(s) = -.211\ (R + 7) + .003\ (R + 7)^2 + .409R - .0073R^2$$

Whereas, the incremental value for these factors after a move is

$$I(m) = -.211R + .003R^2 + .409R - .0073R^2$$

The advantage of the move is

$$\text{Adv} = I(m) - I(s)$$

or

$$\text{Adv} = 1.330 - .042R$$

There exists an economic reason to move after promotion to professor, but the longer one procrastinates before moving, the less expected financial advantage. Similar analyses can be undertaken for other cases based on the rank of the faculty member and assumptions about prior experience and tenure.

Administrative responsibility (being a dean or chairperson) is important only after one becomes a professor. There seems to be little reason for those in the other two ranks to accept this "opportunity," at least from the standpoint of initial pay raises. This advice is especially sound if the appointment requires shifting from a 9-month appointment to an 11/12-month appointment. Nine-month-equivalent salaries were computed as 9/11 of the calendar-year salaries, and, based on this conversion, it is economically detrimental to hold a calendar-year position.

V6 Instructional Load

As an assistant professor, it appears somewhat detrimental to salary to teach introductory classes; a similar caution, however, does not hold for the other two ranks (see Table 6). On the other hand, it is important to teach graduate students, especially when one is a professor or associate professor. As an example of substitution of activities, consider the professor who can either teach or be the principal investigator on an external grant. Having been a principal investigator on an externally funded grant increases the score on the same item in V4 by 2 points.

TABLE 6. Regression Weights for Instructional Load

Number of students	Professor	Associate	Assistant
Introductory classes	—	—	—
Graduate classes	.223	.232	−.087

TABLE 7. Regression Weights for Current Time in Activities

Activity	Professor	Associate	Assistant
Administration	.252	.129	.085
Teaching	−.435	−.210	—
Preparation for Teaching	−.126	−.098	—

This change represents an estimated increase of .488 × 2 or $976. Dividing this by the weight for teaching graduate students (.976 ÷ .222) equals an increased score of about 4, or an increase from none to 50 to 100 graduate students.

V7 Current Time in Activities

As one advances in rank, it becomes important, from an "expected salary" perspective, to avoid spending too much time teaching or preparing for teaching (see Table 7). An administrative assignment for an established professor will increase the likelihood for salary increases. A professor who spends 5 to 8 hours per week more than a peer in administration, 1 to 4 hours less in teaching and 1 to 4 hours less in preparation is expected to earn (2 × .252 + .435 + .126) or about $1,065 more per year than a peer.

DIRECT EFFECT OF VARIABLES

The preceding results review the importance of various items in terms of changes in expected salary. For example, an associate professor who spends 1 to 4 hours teaching has an expected salary of $210 less than a peer who does not teach. By forming the seven composite variables for each rank and looking at the standardized beta weights for these seven variables, the direct effect of the component can be compared with each other within a rank as well as across rank. The results for the three regression equations based on the composite variables are shown in Table 8.

TABLE 8. Direct Effects of Seven Variables on Academic Equivalent Salary for Faculty by Rank

Variable	Professor	Assoc. Prof.	Asst. Prof.
V1 Geography	.167	.282	.185
V2 Control	.066	.118	.073
V3 Personal Characteristics	.237	.274	.348
V4 Productivity	.245	.155	.162
V5 Institutional Recognition	.376	.274	.265
V6 Instruction	.067	.108	.135
V7 Duties	.166	.150	.048

The factor with the greatest effect for an assistant professor is V3 Personal Characteristics (e.g., field of academic specialty, age, and total experience). The second strongest factor is Institutional Recognition. As one moves from assistant professor to professor, the direct effect of Personal Characteristics on salary decreases by almost one-third as it drops from most important to a rank of third. The direct effect of Institutional Recognition increases by about 40 percent from .265 to .376 to become the factor which has the greatest direct effect on salary increases for professors. The direct effects of Productivity and Duties also increase while the direct effect of Instruction decreases as one progresses in rank.

CONCLUSIONS

In general, the results support prior findings that the salary system currently in effect at research universities places more emphasis on research and administration than on teaching (for example, see the review of studies in Tuckman, 1976). Our findings support the need to include squared terms for the various measures of time; for example, years past degree, years at current institution, or age.

Several major points do warrant specific note. The importance of specific factors changes as one advances from one rank to another. While these shifts are frequently in the direction of trends (for example, the increasing importance of externally funded research as one is promoted), there seems to be no simple way to optimally explain salaries in one single equation for those in the three ranks. In qualitative terms we suggest that higher education has demonstrated differing role expectancies for faculty based on the rank of the faculty member.

In a broad sense the pay structure shifts the faculty member's attention away from teaching and applied research to publication and ad-

ministration in an increasingly strong fashion as one moves up the ladder of ranks. One can note for example the increasingly negative weights for time spent in teaching and preparation for teaching (V7) as one moves from assistant professor to professor. The structure also rewards those who are more mobile.

Another finding is that the direct effect of the seven major variables on salary changes over time. As one advances through the professorial ranks, personal characteristics and the type of student taught have a decreasing direct effect. Conversely, the direct effects of scholarly productivity, institutional recognition, and the time spent in various duties increases as one progresses through the ranks. In an oversimplified statement, these results indicate that promotion and pay accrue to faculty who obtain institutional recognition, do research, and work on publications. While this point has been generally known or at least suspected, the difference which can occur within ranks by those who have played the game according to these rules is sufficient to give a plan of operation to the beginning faculty member.

On a final note, as complex as models become as one seeks to include major factors related to salary, they still suffer the problem of oversimplification. This study did not try to investigate changes due to differing state environments. Curricula or field of study differences are handled as adjustments to the constant in the equation even though prior research has shown that reward structures vary across disciplines (Smart, McLaughlin, Montgomery, 1978).

Much still needs to be done to understand how salary structures have evolved at research universities before we can predict where the process is headed. At the same time mounting evidence is accumulating to suggest that while teaching, research, and public service may be equal, they may not be equally rewarded in terms of salary. The concerns of Stableski (1978) and Meeth (1977) are reinforced when it develops that time spent in teaching actually has an increasingly negative weight as one moves from assistant professor to professor. The direct effect of teaching output (V6) is negatively related to rank. Also as one is promoted, less and less time is spent in the role of teacher.

The financial rewards in a research university, therefore, appear to follow certain patterns. While the field of specialty plays an important influence, other strategies exist which can help the individual to "succeed" financially by really trying.

FOOTNOTES

[1]This conclusion is advanced by Johnson and Stafford (1974) and is substantiated in such studies as Tuckman and Hagemann (1976), Tuckman and Leakey (1975), Tuckman (1976), and McLaughlin, Smart, and Montgomery (1978).

[2]The multiple r values for the equations were .67 for professors, .56 for associate professors, and .57 for assistant professors. The eta (η) for the overall system was .84, which was significantly better than the multiple correlation for a combined equation ($F = 14.3$, $p < .01$). The reader should bear in mind that there was one equation for a rank, and this equation included the reported items from the following seven sets. The forward stepwise procedure tested to see if additional variables would make a significant improvement in the explanation of salary.

[3]These and other statements about maximum earnings as related to time factors were developed by taking the derivative of the regression equation with respect to time, setting first derivatives equal to zero, and solving for the value of the time variable. This causes weights on variables (such as region), which are not specified as a function of time, to go to zero. For example, the contribution to salary from age (A) for professors is $.581A - .0052A^2$. Setting the first derivative equal to zero gives $.518 - .0104A = 0$ or $A = 49.81$ at the maximum.

[4]These terms appear in the ACE study, *Would you characterize your recent scholarship, research, or creative writing as: Pure or basic? Applied? Policy-oriented? Literacy or Expressive? Other?* Respondents could mark more than one descriptor.

[5]Average values for a faculty member at a rank were used to relate all temporal variables to years in the rank at the current institution (R). Other variables were assumed not to be a function of time, hence they have a first derivative of zero. For professors, using the weights for years at the current institution (C), and years in rank (R), one obtains the equation:

$$\$ = -.211C + .003C^2 + .409R - .0073R^2$$

For professors, the average of years at the current institution is 16.627 and the average of years in the rank is 9.027. For the typical professor, the number of years at the institution is equal to years in rank plus 7.60 (16.627 − 9.027 or $R + 7.60$). Substituting $R + 7.6$ for C and collecting terms gives:

$$\$ = -.0043R^2 + .2463R - 1.4303$$

Solving for R where the first derivative is set equal to zero gives $R = 28.3$.

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