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ABSTRACT

This study examines both the existence and the determinants of sex differences in teacher salaries and mobility, administrative salaries, and promotions to administrative positions. Longitudinal data on individual careers in education were used, primarily for educators in Oregon during the period 1971-81, but in some instances for educators in New York during the 1970s. Little evidence is found of sex discrimination in salaries of teachers in the 1970s, and only very small sex-related differences in wage responsiveness and interdistrict mobility were noted. Evidence on promotions to administrative positions indicates that in the early 1970s female teachers were significantly less likely to be promoted than similarly qualified male teachers, but that by the late 1970s the difference was no longer significant. In addition, formal index measures of discrimination declined by about half during the same period. By 1980 no evidence is found of salary discrimination among administrators, when experience in education is allocated into teaching and administrative components. These findings suggest that equal employment opportunity and affirmative action efforts initiated during the 1970s contributed to a reduction in employment discrimination against women in education. (Author/MLF)

Sex Differences in the Educator Labor Market

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Abstract

This study examines both the existence and the determinants of sex differences in teacher salaries and mobility, administrative salaries, and promotions to administrative positions, making significant extensions and refinements of the methods and data previously used to investigate these issues. Our analysis is based upon detailed multivariate statistical methods, including standard regression techniques and maximum-likelihood logistic procedures. Longitudinal data on individual careers in education were used, primarily for educators in Oregon during the period 1971-81, but in some instances for educators in New York during the 1970s. We find little evidence of sex discrimination in salaries of teachers in the 1970s, and surprisingly small sex-related differences in wage responsiveness and interdistrict mobility. Although our initial estimates of discrimination in administrative salaries of six to seven percent for full-time principals and vice-principals are consistent with previous studies, we find no evidence of salary discrimination by 1980-81 when experience in education is decomposed into teaching and administrative components. Our evidence on promotions to administrative positions indicates that in the early 1970s female teachers were significantly less likely to be promoted than similarly qualified male teachers, but that by the late 1970s the difference was no longer significant. In addition, formal index measures of discrimination declined by about half during the same period. Both the evidence on administrative salaries and the evidence on administrative promotions, together with additional evidence we present, suggest that equal employment opportunity and affirmative action efforts initiated during the 1970s contributed to a reduction in employment discrimination against women in education.

Introduction

In this study we investigated a number of dimensions of sex differences in the labor market for educators, including differences in base salaries, extra pay, and, especially, promotions to administrative positions. Within the framework of existing laws and regulations, discrimination in base salaries for teachers should be quite difficult to carry out; yet there has been a great deal of concern about possible discrimination in both administrative salaries and promotions to administrative positions. One manifestation of this concern has been a major advocacy movement leading to affirmative action programs designed to increase the number of female administrators. While all of these areas of discrimination have received serious study, this research provides a number of significant extensions, including the following:

(1) We test for changes in the patterns of base pay, extra pay, and administrative promotions by sex across the decade of the 1970s, rather than simply studying patterns during some single year. Only in this way can we determine changes in the extent of sex differences using an internally consistent sample, as opposed to comparing studies performed at different times by different investigators using different subject populations.

(2) We apply formal methods of measuring economic discrimination as developed in the extensive literature on wage discrimination.

(3) We evaluate the effects of various equal employment opportunity and affirmative action efforts initiated during the 1970s at both the federal and state levels.

(4) We investigate the contribution of differential mobility patterns by sex to apparent discrimination. For example, if females are less responsive than males to wage differentials in deciding to change districts or to leave teaching, then differences in extra pay and administrative promotions, and possibly also sex differences in base pay, could be transmitted into a district because of the presence of such differences elsewhere, either in other school districts or in the economy at large.

(5) We explore the impact of enrollment patterns on sex differences. Affirmative action objectives may be met much more readily in districts that are experiencing rapid growth than in districts that are experiencing enrollment declines and consequent shrinkage of faculties.

(6) We have expanded and extended the data base developed under two previous contracts [Optimal Policy Management for the Educator Labor Market (1979-80), and Effective Personnel Policy Under Enrollment Duress (1980-81)]. The Oregon Certificated Personnel data file, which includes salary and work assignment information for all teachers and administrators in Oregon public schools on an annual basis, was updated by adding two years' information, so as to cover the period 1971-81. In addition a similar file was developed for New York and used in the analysis of administrative promotions. These data files will also be available to other researchers, and we have already supplied data from the Oregon file to other CEPM researchers. For example, we supplied substantial base line data to Elaine Hopson and Mary Frances Callan, who were working under a Ford Foundation grant, and longitudinal data on a cohort of teachers who entered Oregon public school teaching in 1971, for a salary study conducted by Gerald Bogen.

This report is divided into three sections. Section I covers the methodology and results of our research on sex differences in teacher salaries. Section II treats sex differences in administrative salaries, and Section III discusses sex differences in promotions to administrative positions. Two experimental techniques proposed earlier proved to be either infeasible or unnecessary. Consistent with earlier reservations (including those of our project monitor, Ed Dean), an innovative technique for estimating the impact of individual preferences for teaching versus administrative duties on promotions to administrative positions yielded inconclusive results. In addition, the planned procedure for eliminating biases due to the omission of unobserved district-level variables proved unnecessary. Our specification of district characteristics was so detailed (including enrollment trends) that the additional procedure did not appear to warrant the added computing costs which would have been incurred.

I. Sex Differences in Teacher Salaries and Mobility

Using data from our Oregon Certificated Personnel (hereinafter, OCP) file, which provides personal, experience, salary, and assignment information for all certificated personnel in the Oregon public schools for the school years 1971-72 through 1981-82, we performed wage-level regressions for the school years 1973-74 and 1976-77. The dependent variable was the natural logarithm of the total salary per contract day, and independent variables included experience, level of education, type of school and assignment, and location dummy variables for Lane and Multnomah counties, the two most populous counties in the state. The detailed methodology of this procedure is set out in our earlier reports. Female teachers were found to earn 1.8 percent less than males in the earlier year and 1.5 percent less in the later year. However, no sex differences were found in base salaries, i.e., total salaries less extra pay. Thus, the differentials in total teacher salaries are related to extra pay assignments. Although in the earlier years the differential is related mostly to the fact that a smaller proportion of women hold extra pay assignments, in the later years the difference is related more to the types of extra pay assignments held. (Women were less likely to hold long-term extra pay athletic training assignments.) N's were quite large (over 23,000 in both years) and all the estimates discussed above were highly statistically significant (t=statistics over 4.5).

Using OCP data for educators employed full-time in adjacent school years (that is, the school years 1973-74 to 1974-75 and 1976-77 to 1977-78), we estimate an equation predicting interdistrict mobility, which we interpret as a reduced-form representation of both the quit behavior of individuals

and the layoff behavior of employers. Maximum-likelihood estimates of a multinomial logistic specification are employed. The dependent variable is a binary variable indicating a chanage in school district from the first to the second year; two percent of Oregon educators made such changes from 1973-74 to 1974-75, and three percent from 1976-77 to 1977-78. Female educators were not significantly more likely than males to change districts in the first years, but were 3.9 percent less likely to change districts from 1976-77 to 1977-78. When experience is taken into account by means of the FEXP variable, female educators were 0.3 percent more likely to change districts in the first years (but only weakly significant, t=1.57) and 0.4 percent more likely to change in the later years.

To test whether wage differentials within the educator labor market are a significant factor in determining individual patterns of wage change for educators, we estimated logarithmic wage-change equations using the same explanatory variables as in the interdistrict mobility equations. The dependent variable is the logarithmic difference between the wage in one year and the wage in the previous year. We find small but significant differences between the responses of wage changes to changes in the level of experience for males and females in the OCP data. Moreover, the relationship between wage changes and experience is nonlinear. Females experienced 0.5 percent lower wage change in the first years and 0.3 percent less in the later years. FEXP was small but positive, 0.07 percent and 0.06 percent for the two pairs of years, respectively, indicating once again that apparent discrimination vanished or was reversed when the lower average experience of female educators was taken into account.

Overall, then, we find little evidence of sex discrimination in salaries of Oregon teachers in the 1970s, and only very small sex-related differences in either wage responsiveness or interdistrict mobility.

II. Sex Differences in Administrative Salaries

Introduction

This section examines sex differences in the salaries of full-time principals and vice-principals in Oregon public schools for the period 1971-72 and 1980-81. Previous investigations of sex differences in administrator salaries have typically found that salaries for women are significantly lower than those for men. A national survey of salaries for administrators conducted by the National Association of Secondary School Principals (1976), for example, found that only 25 percent of male administrators earned less than $20,000 while 70 percent of female administrators earned less than that amount. Moreover, a subsequent study by Smith (1977) of average salaries for administrators in Pennsylvania public schools indicated that women in all categories earned from $800 to $3,000 less than the annual salaries for men.

We address the issue of sex differences in administrator salaries with two objectives: (1) to apply formal methods of measuring economic discrimination in compensation, and (2) to examine possible changes in discrimination during the period 1971-72 to 1980-81, as well as the effects of various anti-discrimination and equal employment opportunity (EEO) efforts initiated during the 1970s. This section sets out a standard model of compensation based upon human capital theory and briefly discusses methods of measuring discrimination in compensation, reviews pertinent EEO and affirmative action legislation and enforcement guidelines at the state and federal levels, describes the data for Oregon administrators, and then presents and evaluates the empirical results.

Theoretical Framework

Our analysis of sex differences in administrator salaries follows the traditional human capital approach to the masurement of wage discrimination (e.g., Malkiel and Malkiel 1973; Mincer and Polachek 1974; Oaxaca 1973a, 1973b; Polachek 1975; and Antos and Rosen 1975). Thus, an individual administrator's salary (S) is specified as

$$S = e^{X\beta + \varepsilon} \qquad (1)$$

where X is a vector of individual productive characteristics (e.g., education and experience levels) and other job-related attributes (e.g., size of district, grade-level, and enrollment trend); β is the vector of coefficients corresponding to the individual and job-related characteristics; and ε is an error term. Eq. (1) is specified in traditional semilogarithmic form, and is transformed for estimation to the linear equation

$$\log S = X\beta + \varepsilon \qquad (1')$$

The standard approach to measuring wage discrimination (e.g., Polacheck 1975) requires separate coefficient estimates for males and females and asks the question, "How much would the sex differential in wages narrow if women were subject to the male wage structure, but the work-related characteristics of women remained as they are?" The answer is obtained by multiplying the male coefficients by the mean values of the explanatory variables for females, summing the products, and subtracting the actual (log) mean wage for women. This gap is a measure of apparent discrimination. Strictly speaking, however, one should interpret the gap as the residual effect of all omitted variables, e.g., unmeasured human capital, individual aspirations, and institutional features, as well as discrimination.

Alternatively, one can ask, How much would the sex differential in wages narrow if men were subject to the female wage structure, but the characteristics of men remained as they are? The answer to this question is obtained by multiplying the female coefficients by the mean values of the exploratory variables for males, summing the products, and subtracting this sum from the actual (log) mean wage for men. This gap is also a measure of apparent discrimination. As with any index-number problem, however, the two measures need not be consistent. Since such a small proportion of administrators are women, the dominant compensation structure for administrators is clearly the male one. Hence, we rely only upon the male salary structure to measure levels and changes in apparent discrimination.

EEO and Affirmative Action

By calculating and comparing indexes of apparent discrimination for the 1970s, we seek not only to gauge the extent of discrimination in salaries for male and female administrators, but also to explore whether EEO and affirmative action efforts implemented during the period have affected sex differentials in salaries. Our method, however, is informal--we attempt no formal, direct test of the results of such efforts.

The major EEO enforcement effort during the period is the federal Title IX amendment passed in 1972 and related enforcement guidelines issues in 1975 which apply to educational institutions. A relevant portion of the enforcement guidelines reads as follows:

> (A) General. (1) No person shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination in employment, or recruitment, consideration, or selection therefore, whether full-time or part-time, under any education program or activity operated by a recipient which received or benefits from Federal financial assistance.
>
> (2) A recipient shall make all employment decisions in any education program or activity operated by such recipient in a nondiscriminatory manner and shall not limit, segregate, or classify applicants or employees in any way which would adversely affect any applicant's or employee's employment opportunities or status because of sex (Barrer 1976, p. 376).

We emphasize Title IX rather than the more generally applied Title VII because the enforcement provisions of Title IX are both more extensive and more severe than those under Title VII, including suspension of federal funds.[1]

In Oregon the federal Title IX regulations are complemented by similar requirements by the Oregon State Board of Education. Oregon Administrative Rule (O.A.R.) 581-22-241 adopted in early 1976 requires that local public school districts maintain personnel policies that assure equal employment opportunity; provide position descriptions, job requirements, and evaluation procedures for all personnel; and offer equal compensation for equal work. Violation of these rules can result in the withdrawal of all state basic school support funds by the Oregon Department of Education.[2]

Data and Empirical Results

Data

Our empirical analysis is based upon data from the Annual Report on Certificated Personnel maintained by the Oregon Department of Education. This is an annual census of all certificated elementary and secondary teaching

and administrative personnel in the state of Oregon, as of October 1 of each school year. By compiling these data by year and matching yearly records for the same educator, we are able to observe employed educators from year to year within Oregon even if they move from one district to another. Complete data are available for the school years 1971-72 through 1980-81 for about 31,000 to 32,000 educators each year.

We construct two sets of files from the Oregon data. The first consists of cross-section files of all full-time principals and vice-principals for the years 1971-72 and 1980-81. By estimating separate salary structures for men and women for the two years, we can measure both existing differentials in each year and changes in differentials between the two years. An important limitation of the first set of files is that the information on experience cannot be decomposed into teaching and administrative components. Hence, we construct a second cross-section file for full-time administrators in 1980-81 who became administrators only after 1971-72. By tracing the longitudinal work history of those who became administrators only after 1971-72, we are able to separate total experience into experience as a teacher, experience as a principal or vice-principal, and experience as another type of administrator.

Empirical Results

The variable names, definitions and means for the first group of administrators are presented in Table 1 for 1971-72 and 1980-81. These are all the full-time principals and vice-principals for these two years. Two education variables (ED1 and ED2) indicate attainment of a master's degree or a doctorate (or their equivalent in credit hours). The two experience variables indicate the total number of years of experience in education (EXP) and the total number of years squared (EXPSQ). The three administrative

Table 1 Variable Definitions and Sample Means for Principals and Vice-Principals in Oregon

Variable	Definition	1971-72		1980-81	
		Male	Female	Male	Female
ED1	One for master's or equivalent, zero otherwise.	.917	.838	.905	.853
ED2	One for Ph.D. or equivalent, zero otherwise.	.023	.015	.042	.061
EXP	Years total experience in education.	17.343	24.309	19.836	15.634
EXPSQ	EXP squared	368.252	701.574	450.169	299.110
SECP	One if secondary principal, zero otherwise.	.212	.044	.192	.055
ELEMP	One if elementary principal, zero otherwise.	.592	.765	.547	.604
SECVP	One if secondary vice-principal, zero otherwise.	.175	.147	.196	.220
SMALL	One if in district under 500 students, zero otherwise.	.107	.088	.113	.152
UP	One if district enrollment increased more than one percent, zero otherwise.	.215	.162	.247	.213
DOWN	One if district enrollment decreased more than one percent, zero otherwise.	.269	.309	.272	.262
LANE	One if in Lane County, zero otherwise.	.130	.118	.111	.116
MULT	One if in Multnomah County, zero otherwise.	.131	.250	.131	.274
LOGS	Logarithm of salary per contract day.	4.221	4.211	4.890	4.856
No. Observations		1064	68	1194	164

Notes: Data are described in detail in the text. SECP, ELEMP, and SECVP are compared to elementary vice-principals, the omitted group.

appointment variables denote secondary principals (SECP), elementary principals (ELEMP), and secondary vice-principals (SECVP). Elementary vice-principals are the reference group for these variables. The two district enrollment variables indicate enrollment increases exceeding 1 percent (UP) and enrollment decreases exceeding 1 percent (DOWN). Districts with enrollment increaes or decreases of less than 1 percent constitute the reference group. The district size variable (SMALL) denotes districts of fewer than 500 students. Finally, two geographic variables are used to control for effects related to the two most urbanized counties in Oregon--LANE for Lane County and MULT for Multnomah County.

There are a number of significant changes in the relative magnitudes of the male and female means between 1971-72 and 1980-81. The proportion of female administrators with a doctorate (ED2) increased by about 400 percent, more than twice the increase for males. In addition, although female administrators in 1971-72 had about seven years greater total experience than males, in 1980-81 they had about four years less experience. Finally, the proportion of female administrators in small districts (SMALL) almost doubled during the period, going from less than the male proportion to greater than the male proportion. Interestingly, the average salaries for men and women differed only by about 1 percent in 1971-72 and by about 3 percent in 1980-81.

The dramatic turnaround in relative experience levels of male and female administrators is at least suggestive evidence for the effects of EEO and affirmative action policies, and stands in sharp contrast to earlier evidence (e.g., the evidence surveyed in Haven, Adkinson, and Bagley 1980). However, the turnaround is consistent with evidence of a reduction in discrimination in administrative promotions presented later in this report.

Table 2 presents (log) salary regressions for male and female administrators in Oregon for the school years 1971-72 and 1980-81. For males, the signs and magnitudes of the estimated coefficients are as expected in both 1971-72 and 1980-81, except perhaps for the increasing enrollment variable (UP). The estimates for this variable indicate that male administrators in increasing enrollment districts are paid significantly less than similar administrators in other districts. Although a variety of explanations are possible, one explanation is that enrollment increases in these districts greatly exceed revenue increases, squeezing salaries for present administrators. For women, the signs and magnitudes of the estimated coefficients are relatively imprecise and volatile in both 1971-72 and 1980-81, perhaps due to the small sample sizes (68 and 164, respectively). Even so, the results largely conform with expectations. In 1971-72, the only coefficients that differ significantly for males and females are those for SECP and SMALL. Male secondary principals earn significantly more than female administrators. In 1980-81, the only coefficient that differs significantly for men and women is EXPSQ--effects of experience appear to diminish less rapidly as experience increases for women than for men.

As discussed earlier, however, formal measurement of apparent discrimination requires the computation of the salaries women would earn if they were subject to the structure determining male salaries, but retained the same individual characteristics. In 1971-72, this procedure yields a salary per contract day of 4.277 in logarithmic terms. Since the average (log) female salary is 4.211, apparent discrimination is measured to be 6.6 percent. In 1980-81, the procedure yields a (log) salary per contract day of 4.934. Since the average (log) female salary is 4.856 in 1980-81, apparent discrimination is measured to be 7.8 percent, roughly the same as in 1971-72. These results

Table 2 Salary Regressions for Principals and Vice-Principals in Oregon

Independent Variables	1971-72			1980-81		
	Male	Female	Difference	Male	Female	Difference
Intercept	3.849**	3.760**	.089	4.527**	4.614**	-.087
	(101.37)	(47.46)	(1.01)	(179.31)	(77.08)	(-1.34)
ED1	.075**	.040	.035	.036**	.001	.035
	(3.85)	(1.14)	(.87)	(2.50)	(.03)	(.96)
ED2	.131**	-.035	.166	.118**	.115**	.003
	(3.77)	(-.35)	(1.57)	(5.69)	(2.54)	(.06)
EXP	.0105**	.0065	.004	.0134**	.0061	.0073
	(5.75)	(1.51)	(.86)	(6.17)	(1.33)	(1.44)
EXPSQ	-.0001**	-.0001	.000	-.0002**	-.0000	-.0002*
	(-3.17)	(-.85)	(.04)	(-4.00)	(-.41)	(-2.26)
SECP	.123**	-.051	.174*	.113**	.112**	.001
	(3.88)	(-.66)	(2.08)	(7.78)	(2.55)	(.02)
ELEMP	.075**	.172**	-.097	.079**	.068**	.011
	(2.42)	(3.05)	(-1.51)	(5.92)	(2.52)	(.37)
SECVP	.051	.055	-.004	.054**	.085**	-.031
	(1.60)	(.91)	(-.06)	(3.83)	(2.82)	(-.93)
SMALL	-.112**	-.195**	.083*	-.095**	-.091**	-.004
	(-7.62)	(-5.41)	(2.13)	(-9.37)	(-3.52)	(-.14)
UP	-.050**	-.029	-.021	-.023**	-.032	.009
	(-4.08)	(-.85)	(-.58)	(-2.75)	(-1.33)	(.35)
DOWN	-.037**	-.102**	.065	-.048**	-.032*	.016
	(-2.98)	(-3.19)	(1.89)	(-5.28)	(-1.04)	(.50)
LANE	-.006	-.038	.032	.015	.051*	-.036
	(-.46)	(-1.07)	(.85)	(1.51)	(1.83)	(-1.22)
MULT	.103**	.151**	-.048	.107**	.071**	.036
	(7.06)	(4.53)	(-1.32)	(10.05)	(2.56)	(1.21)
R^2	.230	.689		.325	.343	

* significant at the 5 percent level (one- or two-tailed test).
** significant at the 1 percent level (one- or two-tailed test).

Notes: The t-statistics are in parentheses below the coefficients. The dependent variable is the annual salary per contract day. See text and Table 1 for description of data and definition of variables.

are roughly consistent with those of the National Association of Secondary School Principals (1976) and Smith (1977) and indicate little change in relative standardized salaries for male and female administrators over the period.

A serious problem with the specification of the regression equations in Table 2 is that the experience variable includes all education-related experience--teaching and administrative experience are combined. To circumvent this problem, we use data for full-time principals and vice-principals in 1980-81 who did not become administrators until after 1971-72. Thus, by following the careers of these individuals during the period we are able to observe their accumulation of experience as principals or vice-principals (ADEXP) and experience as other sorts of administrators (OADEXP), as well as experience as teachers (TEXP).

Table 3 presents the means of the variables for this group of administrators, as well as the corresponding salary regressions. The similarity for men and women of the average teaching experience prior to administrative appointment is again suggestive of the effects of EEO and affirmative action (and stands in contrast to earlier results summarized in Haven, Adkinson, and Bagley 1980). As with the estimates in Table 2, the estimates in Table 3 for men are generally significant with the expected signs. Significantly, an additional year of administrative experience (either ADEXP or OADEXP) is worth six to eight times an additional year of teaching experience.[3] In addition, none of the estimated coefficients differ significantly for men and women.

Using the index procedure for calculating apparent discrimination, we find that female administrators would earn a (log) salary per contract

Table 3 Salary Regressions with Separate Experience Variables

Variables	Means		Coefficients		
	Male	Female	Male	Female	Difference
Independent					
Intercept	--	--	4.589**	4.694**	-.105
			(186.40)	(94.77)	(-1.90)
ED1	.874	.828	.049**	-.008	.057
			(2.74)	(-.28)	(1.69)
ED2	.046	.060	.141**	.082*	.059
			(5.01)	(1.72)	(1.07)
TEXP	12.042	11.422	.003**	.001	.002
			(3.97)	(.32)	(.62)
ADEXP	3.560	2.509	.019**	.021**	-.002
			(9.87)	(4.77)	(-.42)
OADEXP	.191	.216	.024**	.008	.016
			(3.82)	(.58)	(1.06)
SECP	.172	.052	.074**	.078	-.004
			(3.91)	(1.51)	(-.07)
ELEMP	.417	.578	.052**	.049*	.003
			(3.13)	(1.74)	(.09)
SECVP	.304	.250	.041**	.076**	-.035
			(2.41)	(2.43)	(-.98)
SMALL	.138	.112	-.072**	-.049	-.023
			(-5.03)	(-1.57)	(-.67)
UP	.285	.216	-.013	-.041	.028
			(-1.06)	(-1.69)	(1.03)
DOWN	.277	.336	-.041**	-.056	.015
			(-2.91)	(-1.59)	(.40)
LANE	.071	.086	-.001	.074*	-.075
			(-.04)	(2.26)	(-1.82)
MULT	.145	.336	.110**	.091**	.019
			(6.97)	(2.83)	(.53)
Dependent					
LOGS	4.860	4.855			
R^2			.381	.435	
No. Observations			523	116	

* significant at the 5 percent level (one- or two-tailed test).
** significant at the 1 percent level (one- or two-tailed test).

Notes: The t-statistics are in parentheses below the coefficients. TEXP, ADEXP, and OADEXP are years of experience in teaching, as a principal or vice-principal, and in other administrative positions, respectively. See text and Table 1 for definition of variables and description of data.

day of 4.854 if they were subject to the structure determining male wages, but retained their individual characteristics. Since the observed (log) salary for female administrators is 4.855, apparent discrimination is measured to be zero. Hence, when experience is decomposed into teaching and administrative components, measured discrimination in 1980-81 declines from 7.8 percent (based on the regressions in Table 2) to zero (based on the regressions in Table 3).

A number of alternative interpretations of these differing results should be addressed. The difference might be attributed to (1) the presence of little or no discrimination at early stages of administrative careers, but substantial discrimination at later stages; (2) the legacy of previous discrimination, i.e., discrimination may have significantly declined for those women now entering administration, but not for women who became administrators in much earlier years; or (3) the possibility that those districts that are least discriminatory in promoting women are also least discriminatory in compensating them as administrators, i.e., the women who became administrators in the period 1971-72 to 1980-81 may be in unrepresentative districts. All three explanations tend to be countered by evidence that the average experience level of women in the second sample (Table 3) is only about one year less than the average for women in the first sample (Tables 1 and 2) and by the fact that the coefficients for administrative experience as a principal or vice-principal (ADEXP) in Table 3 are not significantly different for men and women, indicating no divergence with additional years of administrative experience. Even so, these alternative interpretations impose potential qualifications on our evidence that there is no apparent salary discrimination in 1980-81 when experience is decomposed into teaching and administrative components.

Conclusion

In this study we examined sex differences in the salaries of full-time principals and vice-principals in Oregon public schools for the period 1971-72 to 1980-81. Although our initial estimates of discrimination on the order of 6-7 percent of salary are consistent with previous studies, we find no evidence of salary discrimination by 1980-81 when experience in education is decomposed into teaching and administrative components. This finding stands in sharp contrast to previous studies of administrative salaries which have not decomposed experience in education. Although there are qualifications to our evidence, it clearly suggests a diminution of salary discrimination against female administrators in Oregon during the 1970s. Since major equal employment opportunity and affirmative action initiatives were undertaken during this period, the evidence also tends to suggest that such initiatives have not been fruitless.

Footnotes

[1]The 1977 decision of Romeo Community Schools v. HEW, 438 F. Supp. 1021 (E.D. Mich. 1977) by a federal district court largely invalidated Title IX for employment issues in that district, but most states (including Oregon) remain subject to the full effect of Title IX and the related enforcement guidelines.

[2]O.A.R. 581-22-241 was replaced in 1980 by O.A.R. 581-22-715, which has similar language. See Williams (1981, p. 45).

[3]Quadratic terms for nonlinear effects of the various experience variables are omitted in the specifications presented in Table 3. If included, only the squared term for TEXP for males enters significantly. In any case, none of the substantive results discussed here are altered by considering nonlinear experience effects for this group.

III. Sex Differences in Administrative Promotions

Introduction

Nowhere are sex differences in promotion patterns as stark as in elementary and secondary education, where women constitute a substantial majority of teachers but men an even larger majority of school administrators. Using longitudinal data for individual teachers in Oregon and New York, we examine sex differences in promotions to administrative positions and explore the possible influenc eof equal employment opportunity (EEO) legislation (e.g., the federal Title IX legislation passed in 1972, and enforced through guidelines issues in 1975, which prohibits discrimination against students and education employees on the basis of sex).

Previous investigations of sex differences in employment have concentrated almost exclusively on issues of compensation and occupation segregation, with studies of promotions typically limited to the analysis of aggregate data or poorly-controlled case episodes.. The explanation for this pattern of research is simple: promotions are "low incidence" events that are intrinsically longitudinal, requiring enormous longitudinal data sets for individual employees. Fortunately, the data for Oregon and New York enable us to overcome this obstacle. Each data set contains employment information for tens of thousands of individual educators employed in the state during the 1970s. Thus, we are able to follow the employment pattern of individuals from year to year and district to district. Since the data span the 1970s, we are also able to gauge the effects of EEO and affirmative action policies implemented during this period. Documentation for the influence of such policies is weak in general, but particularly so for administrative promotions in public education.[1]

This section sets out a simple model of promotions based upon human capital theory, briefly discusses methods of measuring discrimination, offers a framework for analyzing the influence of EEO and affirmative action policies, and then presents and evaluates the empirical results for the two states.

Theoretical Framework

Our analysis of promotions to administrative positions follows the traditional human capital approach to the measurement of wage discrimination (e.g., Malkiel and Malkiel 1973; Mincer and Polachek 1974; Oaxaca 1973a, 1973b; Polachek 1975; and Antos and Rosen 1975, who apply hedonic labor market analysis to the issue of wage discrimination in public education). Both the probability of exceeding minimum qualification requirements for a higher position and the probability of exceeding the qualifications of other applicants are directly related to an individual's qualifications. Hence, we specify the probability of being promoted to an administrative position as primarily a function of individual characteristics relevant to administrative work in education (e.g., experience and education).

This promotion model is estimated using the multivariate logit technique since ordinary least square estimators are inefficient and inconsistent when the dependent variable takes on qualitative values. Thus, the probability that an individual teacher (j) is promoted to an administrative position between one period and a subsequent period is assumed to be expressed by

$$P(ADMIN)_j = e^{b'X_j}/(1 + e^{b'X_j})$$

where P(ADMIN) is the probability of promotion to an administrative position and b (X) is a vector of coefficients (explanatory variables).[2]

Measuring Discrimination

The standard approach to measuring apparent wage discrimination (e.g., Polachek 1975 requires separate coefficient estimates for males and females and asks the question, "How much would the sex differential in wages narrow if women were subject to the male wage structure, but the work-related characteristics of women remained as they are? The answer is obtained by multiplying the male coefficients by the mean values of the explanatory variables for females, summing the products, and subtracting the actual (log) mean wage for women. This gap is a measure of apparent discrimination. Strictly speaking, however, the gap is the residual effect of all omitted variables, e.g., unmeasured human capital, individual aspirations, and institutional features, as well as discrimination.

Alternatively, one can ask the question, "How much would the sex differential in wages narrow if men were subject to the female wage structure, but the characteristics of men remained as they are?" The answer to this question is obtained by multiplying the female coefficients by the mean values of the explanatory variables for males, summing the products, and subtracting this sum from the actual (log) mean wage for men. This gap is also a measure of apparent discrimination. As with any index number problem, the two measures need not be consistent.

For application to promotion discrimination, we modify this procedure in two ways. First we use the individual values of the explanatory variables rather than the mean values. That is, the predicted promotion rate is calculated as the average of the individually predicted promotion rates. This is necessitated by the highly nonlinear nature of the logistic function underlying the logit estimation procedure. Second, since so few women are promoted, the dominant promotion structure is clearly the male one. Hence, we rely only upon the male promotion structure to measure levels and changes

in apparent discrimination.

Public Policy Influence

By calculating and comparing indexes of apparent discrimination for periods during the 1970s, we seek not only to gauge the degree to which the observed difference in promotion rates for males and females can be explained by differences in individual characteristics, but also to test whether the gap left unexplained has been affected by EEO and affirmative action efforts implemented during the period. Our method of testing the possible influence of such efforts is necessarily implicit: we estimate promotion structures before and after the initiation of enforcement efforts and assess the degree to which observed changes might be attributable to such efforts. If other factors that influence sex differences in promotions during the period are assumed to change slowly, sharp changes in sex differences in promotions can be tentatively attributed to policy intervention. However, we do rely upon auxiliary evidence in apportioning any observed changes between the influence of policy intervention and other factors.

The major EEO enforcement effort we consider is the federal Title IX amendment passed in 1972 and related enforcement guidelines issued in 1975 which apply to educational institutions. A relevant portion of the enforcement guidelines reads as follows:

> (A) General. (1) No person shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination in employment, or recruitment, consideration, or selection therefore, whether full-time or part-time, under any education program or activity operated by a recipient which received or benefits from Federal financial assistance.

> (2) A recipient shall make all employment decisions in any education program or activity operated by such recipient in a nondiscriminatory manner and shall not limit, segregate, or classify applicants or employees in any way which would adversely affect any applicant's or employee's employment opportunities or status because of sex (Barrer 1976, p. 376).

We focus on Title IX rather than the more generally applied Title VII because the enforcement provisions of Title IX are both more extensive and more severe than those under Title VII, including suspension of federal funds.[3]

In Oregon the federal Title IX regulations are complemented by similar requirements by the Oregon State Board of Education. Oregon Administrative Rule (O.A.R.) 581-22-241 adopted in early 1976 requires that

> (1) Each local district shall maintain personnel policies including, but not confined to, the following:
> (a) an affirmative action plan assuring equal employment opportunity;
> (b) position descriptions, job requirements, and evaluation procedures for all personnel; and
> (c) a liaison system between the local board and its employees.
>
> (2) Personnel policies shall be provided to all school employees and made available to the public.

Violation of these rules can result in the withdrawal of all state basic school support funds by the Oregon Department of Education.[4]

In New York there is no equivalent to O.A.R. 581-22-241, although there are statements of similar policies by the state Board of Regents. Thus, while New York is fully subject to the provisions of federal Title IX and its enforcement guidelines, there is no state-level enforcement involving possible suspension of state funds. Thus, comparison of Oregon and New York provides an opportunity to distinguish the relative effectiveness of the federal versus state-level measures.

Since federal enforcement of Title IX began essentially in 1975 for both New York and enforcement of O.A.R. 581-22-241 began in early 1976 for

Oregon, we can partition the 1970s into the pre-enforcement period prior to the 1975-76 school year and the enforcement period subsequent to that year.

Empirical Results

In this section we present and evaluate empirical results for both Oregon and New York. For a number of reasons, we view the empirical analysis for Oregon as our primary evidence, and that for New York as secondary. First, the New York data cannot be partitioned into pre- and post-enforcement periods that coincide exactly with the implementation of federal and state enforcement efforts, whereas the Oregon data can be partitioned on that basis. Second, the two periods for New York are not of equal length, with one period consisting simply of two adjacent years. Finally, the empirical specification we are able to estimate for New York is less complete than the specification for Oregon, as discussed below. Nevertheless, the New York results do provide evidence that enhances the interpretation of the Oregon results and that suggests the generality of the conclusions.

Oregon

The empirical analysis for Oregon is based upon data from the Annual Report on Certificated Personnel maintained by the Oregon Department of Education. This is an annual census of all certificated elementary and secondary teaching and administrative personnel in the state of Oregon, as of October 1 of each school year. By compiling these data by year and matching yearly records for the same educator, we are able to observe employed educators from year to year within Oregon even if they move from one district to another. Complete data are available for the school years 1971-72 through 1978-79 for about 31,000 to 32,000 educators each year. Since we have a longitudinal census

of employees, we are able to estimate detailed promotion structures. In the absence of such data, previous studies have been unable to estimate such detailed structures.

To examine the possibility of structural change, we divide the full period into equal subperiods, 1971-72 to 1974-75 and 1975-76 to 1978-79. In each three-year period, we begin with all teachers who are not administrators at the beginning of the period but who are employed full-time at both the beginning and end of the period. Thus, we are able to observe all promotions of teachers to administrative positions from the pool of non-administrative educational personnel. This division corresponds to the implementation of enforcement guidelines for Title IX in mid-1975 and the adoption of O.A.R. 581-22-241 in early 1976. Thus, comparison of sex differences in promotions after 1975-76 to sex differences in promotions before that year offers a tentative appraisal of the effectiveness of the two government policies.

Differences in promotion behavior between these two periods, however, cannot be attributed entirely to these policies. Undoubtedly, other factors such as changes in social attitudes and changes in professional aspirations among women may also be important. Even so, if these other factors evolved relatively slowly, sharp changes in sex differences in promotions can be tentatively attributed to public policy intervention.

Table 1 presents the definitions and sample means by sex for the dependent variable (ADMIN) and the explanatory variables. All variables refer to the beginning of the period unless otherwise indicated. ADMIN includes superintendents, assistant superintendents, principals, vice-principals, directors, consultants, and administrative specialists, with the largest proportion accounted for by the principal and vice-principal categories. Total teaching experience is decomposed into experience outside the district (EXOD) and experience inside

Table 1 Variable Definitions and Sample Means for Oregon

Variable	Definition	1971-72/1974-75		1975-76/1978-79	
		Male	Female	Male	Female
ADMIN	One if an administrator by end of period, zero otherwise.	.040	.010	.036	.013
EXOD	Years teaching experience outside district.	2.346	2.569	2.0062	2.021
EXID	Years teaching experience inside district.	6.553	7.019	7.891	7.374
DROP	One if out of teaching more than one year during period, zero otherwise.	.102	.099	.070	.097
EDUC	Equal to one for work beyond bachelor's; two for master's; three for a doctorate.	1.212	.689	1.314	.894
EDOT	One if EDUC changed during period, zero otherwise.	.167	.181	.215	.318
SEC	One if at secondary level, zero otherwise.	.628	.253	.610	.277
OTHER	One if not regular classroom teacher, zero otherwise.	.065	.075	.072	.091
EXTRA	One if performing work for extra pay, zero otherwise.	.514	.152	.589	.247

Notes: Unless otherwise indicated variables refer to the beginning of each period. Elementary school teachers are the omitted group for SEC. The data source is described in the text.

the district (EXID) to allow for possibly varying effects. A third experience variable (DROP) indicates whether the educator dropped out of teaching for more than one year during the period. One year was allowed because the high incidence of reporting errors caused virtually all teachers to appear to drop out of teaching for one year. The education variables measure the extent of graduate work on a linear scale from one to three (EDUC) and whether educational attainment changed during the period (EDOT). The teaching level variable (SEC) accounts for possible differences between the secondary and elementary levels due to either demand or supply factors, and the assignment variable (OTHER) accounts for differences between regular classroom teachers and other educational personnel (e.g., counselors, librarians, speech therapists, etc.). Finally, a variable for extra pay assignments (EXTRA) is included to account both for possible experience effects of the assignments and for possible preference effects (e.g., interest in additional earned income, administrative preferences, etc.).[5]

Maximum-likelihood estimates of the logistic empirical specification of the determinants of promotions to administrative positions are presented in Table 2 for both the 1971-72 to 1974-75 and 1975-76 to 1978-79 periods. The asymptotic t-statistic is in parentheses below each coefficient. In addition, the difference between the male and female coefficients (and corresponding t-statistic) is listed alongside the estimates for each period.

Surprisingly, the experience variables are mostly insignificant, and experience inside the district (EXID) is significantly negative (.05 level) for the later period. This suggests that relatively narrow, or perhaps idiosyncratic, experience may actually be harmful to the prospects of promotion. The education variables (EDUC and EDOT) are significantly positive in both periods (0.5 level), and the female coefficients do not differ significantly from the male

Table 2 Logit Estimates of Promotions for Oregon
(t-statistics in parentheses)

Independent Variables	1971-72 to 1974-75			1975-76 to 1978-79		
	Males	Females	Difference	Males	Females	Difference
Intercept	-4.163	-5.385	1.222	-5.835	-6.548	.713
	(-19.20)	(-20.80)	(3.62)	(-19.32)	(-16.05)	(1.41)
EXOD	.005	.012	-.007	.023	.060	-.037
	(.31)	(.54)	(-.26)	(1.54)	(3.14)	(-1.50)
EXID	-.019	.011	-.030	-.038	-.058	.020
	(-1.69)	(.68)	(-1.53)	(-3.29)	(-2.98)	(.88)
DROP	-.336	.264	-.600	-.123	.076	-.199
	(-1.51)	(.80)	(-1.50)	(-.53)	(.26)	(-.03)
EDUC	.801	.847	-.046	1.404	1.355	.049
	(7.63)	(6.21)	(-.27)	(10.08)	(6.84)	(.21)
EDOT	1.046	.353	.693	1.620	1.002	.608
	(5.07)	(1.03)	(1.73)	(6.82)	(2.65)	(1.38)
SEC	-.277	-.240	-.037	.024	1.102	-1.078
	(-2.26)	(-.94)	(-.13)	(.19)	(5.45)	(-4.50)
OTHER	-6.403	-5.478	-.926	-6.591	-7.067	.476
	(-2.21)	(-1.90)	(-.23)	(-2.33)	(-1.87)	(.10)
EXTRA	.204	-.231	-.028	.687	.408	.279
	(1.70)	(-.70)	(-1.23)	(5.06)	(2.05)	(1.16)
F-value	8.58	6.16		18.63	18.21	
Observations	7643	9081		8309	9473	

Notes: Coefficients are maximum-likelihood estimates of a logistic function obtained using the PREDICT procedure in the Statistical Analysis System (SAS). See Table 1 for variable definitions and sample means and the text for a description of the data.

coefficients. The teaching level variable (SEX) is negative and significant for males in the early period and positive and significant for females in the later period. Only in the later period is the difference is the difference in the male and female coefficients significant. The significantly positive coefficient in the later period for females may be due to a catch-up effect at the secondary level, since female promotions at this level have averaged only about 4 percent of the total. Alternatively, it may indicate that females at the secondary level became the most interested in pursuing administrative careers. Educators who are not regular classroom teachers (OTHER) are significantly less likely to become administrators in both periods, and the difference in the male and female coefficients is insignificant in both periods. Work for extra pay (EXTRA) is positively and significantly related to the probability of becoming an administrator in both periods for males, but only in the later period for females. However, there is no statistical difference in the male and female coefficientts in either period.[6]

To summarize, in the early period, only the intercept is statistically different for males and females; and in the later period, none of the coefficients differ significantly for males and females except for SEC, which turns to the advantage of females. Thus, the logit results suggest a significant reduction in apparent discrimination between the two periods. To measure the change more formally we use the procedure outlined earlier. First, we calculate the individual promotion probabilities for females based upon the male promotion structure. The average of these probabilities provides an estimate of the promotion rate for women one would observe if they faced the male promotion structure, but retained the same individual characteristics. Using this approach, only about 38 percent of the difference in actual promotion rates between males and females can be explained by differences in measured characteristics

in the early period, but 68 percent of the difference can be explained in the later period.[7] This implies a reduction of about 50 percent in apparent discrimination betwen the two periods.

Although we are unable to perform a formal test for whether this dramatic change is attributable primarily to EEO efforts (i.e., Title IX and O.A.R. 581-22-241), the change is both significant and sharp. Moreover, the pattern of discrimination complaints filed with the Oregon Bureau of Labor and Industries dealing with employment in education is also consistent with the hypothesis that policy intervention made a difference. The average number of individual complaints from school districts was 21 per year in the 3 years prior to 1975, rose to 46 in 1976-77, declined to 16 in 1978, and declined further to only 9 in 1980 (Williams 1981, p. 53). Combined with the evidence in Table 2, this pattern indicates that complaints were low prior to O.A.R. 581-22-241 and the enforcement of Title IX, rose substantially in the period of implementation, and declined sharply thereafter, presumably due to the diminution of discrimination. In addition, evidence on the proportion of female teachers seeking administrative certification in Oregon during the 1970s supports the hypothesis that aspirations to administrative positions among female teachers rose smoothly during the period (Stockard 1980, pp. 40-48). Thus, we conclude that EEO legislation and enforcement appears to have significantly reduced apparent sex discrimination in Oregon. We are unable at this point, however, to determine the relative importance of Title IX versus O.A.R. 581-22-241.

New York

The empirical analysis for New York is based upon data obtained from the New York Department of Education for the school years 1972-73, 1976-77,

and 1977-78. As with the Oregon data, by matching yearly records for the same educator, we are able to observe employed educators in each year even if they move from one district to another.[8] To examine the issue of structural change, we divide the data into the two periods, 1972-73 to 1976-77 and 1976-77 to 1977-78. In each period we begin with all those teachers who are not administrators at the beginning of the period, but who are employed full-time at both the beginning and end of the period.

Unfortunately, these data and sample periods for New York pose two difficulties. First, the break in the two periods comes one year too late to coincide with the implementation of Title IX enforcement efforts. Thus, the "pre-enforcement" period for New York contains three years of pre-enforcement promotions and one year of post-enforcement promotions. The severity of this problem depends upon how quickly enforcement became effective. The problem disappears, for example, if the enforcement took at least a year to have significant effects. With no information on the timing of the effects, however, we suspect that any structural change due to EEO enforcement will be less distinct for New York than for Oregon. Second, the post-enforcement period contains only two adjacent years. This not only reduces the number of observed promotions, but also confounds the use and interpretation of DROP and EDOT. Consequently, we discuss estimates for the later period based on specifications with and without measures of these two variables.

The definitions and means of the dependent and explanatory variables for New York are displayed in Table 3. The variables for New York are constructed in the same fashion as their Oregon counterparts with three exceptions. As mentioned above, it is not meaningful to calculate DROP and EDOT in the post-enforcement period since this period is only a year long. To circumvent this problem, these two variables are calculated for the period between 1972 and 1978, hence

Table 3 Variables and Sample Means for New York

Variables	1972-73 to 1976-77		1976-77 to 1977-78	
	Males	Females	Males	Females
ADMIN	.031	.008	.010	.003
EXOD	2.980	3.160	3.086	3.286
EXID	8.496	8.219	12.276	12.009
DROP	.018	.035	.029*	.048*
EDUC	1.315	.992	1.597	1.379
EDOT	.221	.266	.255*	.298*
SEC	.686	.323	.679	.322

*These values are calculated for the 1972-73 to 1977-78 period.

Notes: See Table 1 for a definition of the variables and the text for a description of the data.

require some reinterpretation. In addition, it is not possible to calculate a variable for extra pay assignments or for not being a regular classroom teacher.

Maximum-likelihood estimates of the logistic promotion model are presented in Table 4 for males and female and for the two periods. The results reveal a large number of statistically significant coefficients at the .05 confidence level, considerably more than for Oregon. The larger proportion of statistically significant coefficients for both sexes and both time periods probably reflects the more formalized promotion procedures in effect in New York. To receive administrative certification and be eligible for promotion, teachers were required to meet certain minimum experience and education requirements, as well as spend the full-time equivalent of six months in a recognized administrative internship program. These requirements help to account for the positive and significant estimates for experience and DROP, since similar requirements related to these variables were not in place in Oregon. The fact that teaching experience is more important in New York than Oregon may also be due to the differences in average district and school size in the two states. Average district size, for example, is about 3000 students in New York but only about 1500 students in Oregon. The negative coefficient for the secondary level assignment variable probably reflects the proportionately fewer administrative openings at the secondary level during both periods.

Although the signs of the statistically significant coefficients are generally consistent for both sexes and both time periods, we find statistically significant differences between males and females in the magnitudes of the coefficients for two variables: the intercept and EDOT. As with Oregon, the intercept differs significantly for males and females in the early period,

Table 4 Logit Estimates of Promotions for New York
(t-statistics in parentheses)

Independent Variables	1972-73 to 1976-77			1976-77 to 1977-78		
	Males	Females	Difference	Males	Females	Difference
Intercept	-4.717	-7.022	2.305	-6.879	-7.116	.237
	(-19.61)	(-19.15)	(5.26)	(-12.26)	(-11.38)	(.28)
EXOD	.058	.046	.011	.089	.061	.028
	(4.35)	(2.09)	(.43)	(3.85)	(1.84)	(.69)
EXID	.034	.053	-.019	.012	.032	-.020
	(3.46)	(3.84)	(-1.12)	(.59)	(1.28)	(-.62)
DROP	.737	.106	.631	.902	.858	.044
	(7.59)	(.23)	(1.34)	(2.23)	(1.65)	(.07)
EDUC	.841	1.133	-.292	1.184	.634	.550
	(2.57)	(6.69)	(-.79)	(4.97)	(2.60)	(1.61)
EDOT	.486	1.270	-.784	.577	-.467	1.044
	(2.28)	(3.93)	(-2.03)	(2.14)	(-1.05)	(2.01)
SEC	-1.205	-.76	-.444	-1.501	-1.294	-.207
	(-10.56)	(-3.25)	(-1.70)	(-6.45)	(-2.74)	(-.39)
F-value	41.56	15.68		17.49	3.80	
Observations	10858	13401		10517	13288	

Notes: Coefficients are maximum-likelihood estimates of a logistic function obtained using the PREDICT procedure of the Statistical Analysis System (SAS). See Table 3 for sample means, Table 1 for variable definitions, and the text for a description of the data.

but not in the later period. Taken alone, this result indicates a reduction in apparent discrimination, presumably due to federal policies. However, when we apply the more formal procedure for evaluating discrimination, as outlined above, little of the difference in actual promotion rates is explained and no significant distinction in apparent discrimination in the two periods is found. The explanation for this result lies with the EDOT and EDUC variables. Both appear to work against a reduction in apparent discrimination. In the early period, the coefficients for both show an advantage for females, but in the later period a disadvantage. The difference in the male and female coefficients and the change in the difference is statistically significant for EDOT. Consequenlty, when the entire promotion structure is considered, the intercept and education variables work in opposite directions, supporting the conclusion that Title IX enforcement had no significant effect. However, when EDOT is dropped, none of the coefficients for males and females differ significantly in the later period, supporting the opposite conclusion that Title IX did have a significant effect. Due to this ambiguity, comparison of Oregon and New York provides little evidence to distinguish the relative effectiveness of federal Title IX versus state-level enforcement similar to O.A.R. 581-22-241.

One explanation for the reversal in the difference in the male and female coefficients for EDOT may lie with the definition of EDOT and a sorting process among female teachers. As mentioned earlier, due to the shortened interval in the later period, our measure of EDOT for this period encompasses EDOT for the early period. This modified construction of EDOT, as compared with Oregon, leads to the possibility that many educators who obtained additional educational credits in order to be eligible for administrative promotions received promotions in the first period. If so, EDOT would explain fewer

promotions in the second period. If an atypically high proportion of those women who acquired additional education also sought administrative positions, then EDOT might spuriously favor the promotion of female teachers in the early period, yet favor the promotion of male teachers in the later period. This explanation is consistent with evidence that females acquired additional education at a faster rate than males, perhaps in anticipation of increased opportunities for promotion. In addition, the number of females receiving certification for administrative positions increased by about 100 percent, while the number of males receiving certification increased by only 6 percent (New York State Department of Education 1981, p. 11).

Conclusion

Two issues were addressed in this paper: (1) is there apparent discrimination in the promotion structures for men and women in public education? and (2) have federal and state equal employment opportunity (EEO) and affirmative action policies reduced any apparent discrimination? Our primary evidence based on Oregon indicates that in the early 1970s female teachers were significantly less likely to be promoted than similarly qualified male teachers, but by the late 1970s the difference is no longer significant. In addition, index measures of apparent discrimination declined by about one-half during the same period. The fact that this sharp change coincided with the enforcement of federal Title IX and state O.A.R. 581-22-241, combined with ancillary evidence on administrative certifications and discrimination complaints, suggests that one or both of these measures influenced the decline in discrimination.

For New York, where only Title IX enforcement was implemented, evidence similar to that for Oregon is found when the intercept is used as a measure of discrimination. However, interpretation of the more general index measures of discrimination is confounded by deficiencies in the data. Hence, the

conclusion that apparent discrimination declined significantly during the 1970s and that EEO enforcement influenced the decline can be made confidently for Oregon, but only tentatively for New York.

Footnotes

[1]The general evidence on EEO Effects is surveyed in Brown (1981). Haven, Adkinson, and Bagley (1980) provide a general survey of sex discrimination in promotions to administrative positions in public education, and Williams (1981) provides a detailed analysis of this issue for Oregon.

[2]See Nerlove and Press (1973) for a more detailed discussion of logistic models.

[3]The 1977 decision of Romeo Community Schools v. HEW, 438 F. Supp. 1021 (E.D. Mich. 1977) by a federal district court largely invalidated Title IV for employment issues in that district, but most states (including Oregon and New York) remain subject to the full effect of Title IX and related enforcement guidelines.

[4]O.A.R. 581-22-241 was replaced in 1980 by O.A.R. 581-22-715, which has similar language (Williams 1981, p. 45).

[5]Information regarding race is not available in the Oregon data. This is not a severe problem, however, since the black population is an extremely small percentage of the total in Oregon and is largely concentrated in Multnomah County. The results reported here are essentially invariant to the inclusion of a dummy variable for this county.

[6]These results are not sensitive to a number of alternative specifications, e.g., the introduction of quadratic terms for experience and education or an interaction term for the two experience variables. In addition, similar results are obtained when considering promotions only to positions requiring formal administrative certification, e.g., vice-principal and principal. Unfortunately, information regarding administrative certification is not available in the Oregon data.

Footnotes (continued)

[7]A potentially important issue we have ignored is how productive characteristics are acquired. There may be secondary discriminatory effects at work at this level. That is, access to extra pay assignments may not be equal, and incentives to invest in further education or experience in extra pay assignments are diminished by discrimination in the "payoff" to these characteristics. If the influence of EXTRA is omitted from the calculations, the proportion of the difference in promotion rates explained by the differences in individual characteristics remains about the same for the early period, but declines somewhat in the later period. However, the change in apparent discrimination between the two periods remains significant.

[8]To reduce the observations to a tractable number for logit estimation, a one-in-four random sample was drawn from the population. In addition, New York City data are excluded from the analysis to avoid possible structural differences.

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