Volume Title: Public Sector Payrolls

Volume Author/Editor: David A. Wise, ed.

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-90291-9

Volume URL: http://www.nber.org/books/wise87-1

Publication Date: 1987

Chapter Title: Comparable Worth in the Public Sector

Chapter Author: Ronald G. Ehrenberg, Robert S. Smith

Chapter URL: http://www.nber.org/chapters/c7156

Chapter pages in book: (p. 243 - 290)

10 Comparable Worth in the Public Sector

Ronald G. Ehrenberg and Robert S. Smith

10.1 Introduction

Some two decades after the passage of the Equal Pay Act of 1963 and Title VII of the 1964 Civil Rights Act, which together prohibit (among other things) sex discrimination in wages on any given job and sex discrimination in access to employment opportunities, it is still common to observe that on average females earn less than males, that females are distributed across occupations in a manner quite different than males, and that earnings in occupations dominated by females tend to be lower than earnings in those dominated by males, even after one controls for traditional proxies for productivity (see, for example, Treiman and Hartmann 1981). The frustrations generated by these outcomes have led to pressure for the adoption of the principle of comparable worth, a principle that at least one participant in the debate has called "the women's issue of the 1980s."[1]

In simplest terms, proponents of comparable worth assert that jobs within a firm can be valued in terms of the skill, effort, and responsibility they require, as well as the working conditions they offer. Two jobs would be said to be of comparable worth to a firm if they were comparable in terms of these characteristics. The principle of comparable worth asserts that *within* a firm, jobs that are of comparable worth to the firm should receive equal compensation.

While some efforts to implement comparable worth have taken place in the private sector, the major push for comparable worth has occurred

Ronald G. Ehrenberg is the Irving M. Ives Professor of Industrial and Labor Relations and Economics at Cornell University and a research associate at the National Bureau of Economic Research.

Robert S. Smith is Professor of Labor Economics at Cornell University.

in the state and local government sector.[2] By the mid-1960s over a dozen states had passed comparable worth legislation covering state employees (table 10.1), although these laws were rarely enforced. Starting with a 1974 state of Washington study, a number of states have undertaken formal job evaluation studies to see how their compensation systems mesh with the principle of comparable worth (table 10.1).[3] In several cases, this evaluation has led to "voluntary" implementation of comparable worth through the legislative and collective bargaining processes (e.g., Minnesota) or to court-ordered implementation (Washington).[4] Table 10.1 summarizes the status of comparable worth initiatives in the fifty states and the District of Columbia, as of the summer of 1984. By this date, nine states had begun the process of implementing some form of comparable worth in their employees' compensation systems.

Comparable worth initiatives have also been undertaken at the local level. Table 10.2 presents data on forty-five cities, counties, and school districts that either had undertaken a study of the issue, had at least one group of employees in litigation over the issue, had passed a local ordinance, or were contemplating implementing or had implemented comparable worth wage adjustments by the summer of 1984. Many of these units were in the states of California, Minnesota, and Washington. Comparable worth wage adjustments were implemented in San Jose, California, after a well-publicized strike of municipal employees; this action undoubtedly influenced the spread to other California units. Minnesota passed a law in April 1984 requiring political subdivisions to evaluate jobs and then revise their compensation structure in accord with comparable worth. Finally, the early Washington comparable worth study attracted attention to the issue in that state.

Given the growing importance of the concept of comparable worth in the public sector,[5] a theoretical and empirical analysis of some of the issues it raises is obviously in order. In section 10.2 we discuss the cases for and against comparable worth, from the perspective of analytical labor economists. These cases are discussed in the context of simple labor market models, and we stress the key assumptions that influence whether the policy might be considered desirable. Ultimately we conclude that the debate over comparable worth must involve a consideration of the trade-off between efficiency and equity.

Sections 10.3 and 10.4 ignore the objections to the principle of comparable worth and, assuming one wants to implement it, discuss some of the conceptual and operational problems involved. Previous studies, primarily by non-economists, have addressed many of the problems in this area (e.g., the existence of sex bias in describing or evaluating jobs, the difficulty of devising evaluation schemes, and the problem of rater reliability), so our discussion of these issues will be brief. Rather, our focus will be on two issues.

Table 10.1 **Status of Comparable Worth Initiatives in States and the District of Columbia, Fall 1984**

State	Existence of a Comparable Worth Job Evaluation Study (1)	Existence of State Legislation Relating to Comparable Worth (2)	Existence of Litigation (3)	Implementation of Comparable Worth (4)
Alabama*				
Alaska	Yes, a	Yes, A (1965)	Yes	No
Arizona*				
Arkansas	No	Yes, A (1949)	No	No
California	No	B, 1983	No	No
Colorado	No	No	No	No
Connecticut	Yes, b	No	Yes	Yes, 1
Delaware	No	Yes, A (1983)	No	No
D.C.	No	No	No	No
Florida	Yes, c	Yes, C (1984)	No	No
Georgia	No	Yes, A (1966)	No	No
Hawaii	Yes, c	Yes, A (1981)	Yes	No
Idaho	Yes, b	Yes, A (1969)	No	Yes, 4
Illinois	Yes, b	Yes, C (1984)	Yes	No
Indiana	No	Yes, D (1984)	No	No
Iowa	Yes, a	Yes, A (1983)	No	Yes, 2
Kansas	Yes, a	No	No	No
Kentucky	Yes, b	Yes, A (1966)	No	No
Louisiana	Yes, a	No	No	Yes, 2
Maine	Yes, a, b	Yes, A (1954)	No	No
Maryland	Yes, b	Yes, A (1966)	No	No
Massachusetts	Yes, a	Yes, A (1945)	Yes	No
Michigan	Yes, b	Yes, A (1962)	Yes	No
Minnesota	Yes, b	Yes, A (1981) E (1984)	No	Yes, 1
Mississippi*				
Missouri	No	Yes, C (1984)	No	No
Montana	Yes, b	No	No	No
Nebraska	Yes, b	No	No	No
Nevada	No	No	No	No
New Hampshire	Yes, a	No	No	No
New Jersey	Yes, b	Yes, D (1983)	No	Yes, 2
New Mexico	Yes, a	No	No	Yes, 2
New York	Yes,a	No	No	No
North Carolina	No	No	No	No
North Dakota	Yes, b	No	No	Yes, 5
Ohio	Yes, a	No	No	No
Oklahoma	No	Yes, A (1965)	No	No
Oregon	Yes, a	Yes, A (1983)	No	No
Pennsylvania	Yes, b	No	Yes	No
Rhode Island	Yes, a	No	No	No
South Carolina	No	No	No	No
South Dakota	No	Yes, A (1966)	No	No

Table 10.1 (continued)

State	Existence of a Comparable Worth Job Evaluation Study (1)	Existence of State Legislation Relating to Comparable Worth (2)	Existence of Litigation (3)	Implementation of Comparable Worth (4)
Tennessee	Yes, a	No	No	Yes, 2
Texas	No	No	No	No
Utah	No	No	No	No
Vermont	Yes, b	No	No	No
Virginia	Yes, b	No	No	No
Washington	Yes, b	Yes, F (1983)	Yes	Yes, 3
West Virginia	No	No	No	No
Wisconsin	Yes, a	Yes, A (1965)	No	No
Wyoming	No	No	No	No

Source: Author's interpretation of material contained in unpublished tables prepared by Alice Cook (Cornell University), based upon responses to questionnaires she mailed in November 1983 to state personnel directors, heads of committees on the status of women, and public employee union leaders, as well as sources published thereafter.

Notes: Column (1): a = formal comparable worth job evaluation study is under way; b = formal comparable worth job evaluation study was completed; c = tabulation of female/male pay differentials by broad occupational classes has been completed; d = the state is contemplating a job evaluation study. Column (2): A = state statute that mandates equal pay in state employment for jobs of comparable worth exists (year adopted); B = state statute that calls for periodic reviews of salaries in job classes dominated by women (year adopted); C = legislation introduced (or being drafted) but not yet enacted; D = funds appropriated to study the issue; E = law requires political subdivisions to do job evaluations and institute salary structure based on comparable worth; F = law requires implementation of comparable worth. Column (3): if yes, at least one group of state employees is in litigation over the issue. Column (4): 1 = implemented, or gearing up to implement, through the collective bargaining process, over a number of years; 2 = implemented, or gearing up to implement, through the legislative process, over a number of years; 3 = to be implemented through court order; 4 = implemented by the state, but allows market forces to influence salaries, not really comparable worth; 5 = implemented compensation based on a factor point system to achieve overall equity, not really considered a comparable worth issue.

*No response to the questionnaire.

First, in section 10.3 we address the attempts by various states to conduct comparable worth job evaluation studies in which wages are related to total job evaluation points; discrimination is then inferred if, on average, female-dominated occupations receive lower wages than male-dominated occupations with comparable total evaluation points. We ask if it is reasonable to simply sum up points over the different job evaluation factors (e.g., training, job responsibility, working conditions) to get a total score for each job, to which wages are then related. This procedure assumes that employers "value" an additional point

Table 10.2 **Comparable Worth Initiatives in Selected Local Governments as of Summer 1984**

Cities	Counties	School Districts
Phoenix, Ariz. (1)(3)	Alameda, Calif. (1)	Tucson, Ariz. (1)
Berkeley, Calif. (3)	Contra Costa, Calif. (1)(3)	Carlsbad, Calif. (1)(3)
Fresno, Calif. (1)	Humboldt, Calif. (1)(3)	Chico, Calif. (1)(3)
Los Angeles, Calif. (2)	Santa Clara, Calif. (1)(2)(3)	Los Angeles, Calif. (1)(2)
Mountain View Calif. (1)	San Mateo, Calif. (3)	Manhattan Beach, Calif. (1)
Palo Alto, Calif. (2)	Sonoma, Calif. (1)	Pittsburgh, Calif. (1)(4)
San Francisco, Calif. (1)	Hennepin, Minn. (1)	Sacramento, Calif. (3)
San Jose, Calif. (1)(4)	Nassau, N.Y. (1)(2)	Vacaville, Calif. (3)
Santa Cruz, Calif. (1)(3)	Fairfax, Va. (2)	Anoka Hennepin, Minn. (2)
S. Lake Tahoe, Calif. (1)	King, Wash. (3)	Minneapolis, Minn. (1)
Colorado Springs, Colo. (1)(3)	Pierce, Wash. (1)(3)	Woodland Hills (Pittsburgh, Pa.) (3)
Minneapolis, Minn. (1)	Thurston, Wash. (1)	
St. Paul, Minn. (1)	Dane, Wis. (1)	
Portland, Oreg. (1)		
Philadelphia, Pa. (2)		
Virginia Beach, Va. (1)(3)		
Olympia, Wash. (1)		
Renton, Wash., (1)(3)		
Seattle, Wash. (1)		
Spokane, Wash. (1)(3)		
Madison, Wis. (1)		

Source: See table 10.1.

Notes: (1) = "comparable worth" job evaluation study underway or completed; (2) = at least one group of employees is in litigation over the issue; (3) = comparable worth wage adjustments contemplated or implemented; (4) = comparable worth wage adjustments implemented after a strike.

of each factor equally. Taking a hedonic wage equation approach, we use data from job evaluation studies conducted in the states of Minnesota, Washington, and Connecticut to estimate empirically if the weights these states actually assign to each factor are equal and, if not, how this affects estimates of male-female comparable worth gaps. We also test in this section whether functional form assumptions affect these estimates.

Total compensation on a job includes opportunities for occupational mobility and subsequent wage growth. The above-mentioned state studies ignore these factors, implicitly assuming that male/female current wage differentials for given job evaluation point scores are not compensated for by opportunities for wage growth. To test this assumption would require longitudinal earnings data for male and female public employees whose initial job evaluation scores are equal. While such data are unavailable, section 10.4 uses data on state and local government employees in New York State from the 1/100 sample of the 1970 *Census of Population* to illustrate how one might indirectly test this assumption. These data permit us to identify individuals' industry and occupation of employment in both 1965 and 1970, as well as their 1969 earnings levels. Mean earnings by three-digit public sector occupation in New York State are constructed from these data and used to obtain estimates of male/female public sector differentials in occupational mobility in the state.

Section 10.5 switches to a different issue: some of the unanticipated (by proponents) side effects of implementing comparable worth in the public sector. Comparable worth wage adjustments (henceforth CWWA) would likely alter at least four types of relative prices that public employers face. First, for any given function (e.g., police) and within any major occupational group (e.g., clerical) the average wage of female employees would rise relative to the average wage of male employees, as some female employees received CWWA. Second, for any given function, across major occupational groups, the average wage of employees in heavily "female" occupations (e.g., clerical) would rise relative to the average wages of employees in heavily "male" (e.g., crafts) occupations, as more employees in the former would receive CWWA. Third, across functions, the average wage in heavily female-dominated functions (e.g., elementary education) would rise relative to the average wage in heavily male-dominated functions (e.g., fire fighters), as employees in the former would again be more likely to receive CWWA. Finally, holding constant the existing distribution of public employees, the average wage of public employees would rise relative to the prices of other goods and services.

It is natural to ask how such relative wage changes would affect the composition of public employment. To the extent that public employers' employment decisions are sensitive to their employees' wage rates, one would expect to observe the four sets of relative wage changes leading respectively to the substitution of some male for some female employees within a function-occupation group, the substitution of some employment in male-dominated occupations for some employment in female-dominated occupations (within a function), the substitution of some employment in male-dominated functions for some employment in female-dominated functions, and a decline in the aggregate level of public employment. For all these reasons, CWWA might be expected to lead to a decline in female employment.

Section 10.5 provides estimates of the extent to which some of these types of adjustments might occur in the state and local sector. Existing estimates of the demand for labor in the public sector are supplemented by new estimates of the determinants of male/female and occupational employment ratios, obtained from 1970 and 1980 *Census of Population* data. Based upon these estimates, a crude simulation of the potential effects of CWWA on female employment in the public sector is presented. Finally, section 10.6 summarizes our findings and presents some brief concluding remarks.

10.2 The Cases for and against Comparable Worth

Consider the simplest possible stylized competitive labor market model.[6] In a competitive labor market a firm hires employees in an occupation or job category until the category's marginal product equals its real wage. A category's marginal product represents its "worth" to an employer. However, this worth is not necessarily fixed over time, but rather depends upon the number of employees hired in the category *and* all other job categories, the quantity of capital available to employees to work with, the production technology, and the quality of employees in the various job categories. The worth of a job then cannot be determined independent of the qualifications of its incumbents and may well change over time. This statement suggests that job evaluation surveys cannot be a one-shot event, but rather must be constantly updated; the worth of a job to an employer is not necessarily constant over time.[7]

Now move to the level of the labor market as a whole. The aggregation of individual firms' demand curves for each occupation leads to market demand curves for the occupation. The supply of labor to each occupation/job category will depend upon workers' qualifications, the pecuniary and nonpecuniary forms of compensation every job offers, and the distribution of preferences across workers for the various jobs. If there are no barriers to occupational mobility, a worker will move between jobs until the "net advantage" he or she perceives from each is equalized. Such movements lead to an equilibrating structure of occupational wage differentials; this structure depends upon the distribution of workers' qualifications and "tastes" for the various jobs.

In this stylized competitive world, all of the factors that comparable worth advocates believe should affect wages (skill, effort, responsibility, and working conditions) would affect wages, since these factors would influence the underlying demand and supply schedules. However, the weight the market would place on each factor in determining wages would reflect the entire distribution of employees' tastes for, and employers' valuation of, each factor, not the weight assigned by a job evaluation scheme.

If in such a world females clustered into lower-paying occupations than males who had comparable productivity-related characteristics (e.g., education), this arrangement would reflect only systematic differences in tastes between males and females for the nonpecuniary characteristics offered by the various jobs. For example, married females with children might have strong preferences for jobs that do not require travel, long hours, or work that must be brought home in the evenings. Given their preferences, males and females would have made optimal career choices and no government intervention would be required.

Of course this conclusion presupposes the validity of the assumptions of the model, a number of which proponents of comparable worth seriously challenge. The first is the assumption that there are no barriers to occupational mobility. If women are systematically excluded from high-paying occupations, one cannot claim that the structure of earnings is the result of voluntary choice. A market economist would respond that an appropriate long-run remedy in this case would be to break down occupational barriers through actions including rigorous enforcement of Title VII of the Civil Rights Act. However, such actions would provide only for gradual improvement of the welfare of the discriminated-against group because they would have to wait for vacancies to occur in the higher-paying male jobs. In addition, for jobs that require training, this policy would benefit primarily new entrants whose time horizons are sufficiently long to enable them to profitably undertake the necessary training.

In the absence of a policy that could (1) create "male" jobs for all qualified females who want them, (2) identify the older women who historic discrimination prevented from making different occupational choices early in their lives and who now could not afford to profitably undertake the necessary investment if the barriers to entry were broken, and (3) provide resources to these women now so that they could undertake the training, it could be argued that a policy calling for comparable worth might make sense. Its justification would be based on equity considerations; one would have to conclude that these would outweigh any efficiency losses that might result. The latter include any decreased female employment caused by the increased wages in these female occupations (see section 10.5).[8]

The second assumption challenged is that wages in female-dominated occupations are determined in competitive markets. There is considerable evidence that employers in some female-dominated occupations, such as public school teaching and hospital nursing, appear to have monopsony power.[9] As is well known, in this circumstance there is a range over which one can "legislate" a higher wage without suffering any employment loss. Whether the wage that would be set under a comparable worth wage policy would fall in such a range cannot be determined a priori, and in any case the vast majority of females are not employed in these occupations. A remedy insuring that employers in these markets actively compete for workers might make more sense than comparable worth.[10]

The case for comparable worth thus seems to rest on the argument that the current occupational distribution of female employees is based on discriminatory barriers that existing legislation has not broken down. Even if one could enforce these laws, breaking down barriers does not help experienced older workers who have invested heavily in occupation-specific training and whose time horizon is now too short to profitably undertake new occupational investments. Comparable worth is one of several policies that could provide a remedy for these workers.[11] Whether it is a desirable policy depends upon one's perceptions of how the benefits it provides contrast with the efficiency losses it induces. Just as with one's perception about the value of the minimum wage, given the trade-offs involved, ultimately one's position on comparable worth must depend on value judgments.

10.3 Comparable Worth Job Evaluation Studies

Suppose one ignores the objections to comparable worth posed by economists and decides that a governmental unit's compensation structure should be determined solely by this principle. The first task one would face would be to devise a job evaluation scheme to measure the worth of each job. Numerous evaluation schemes currently exist, but a host of problems make the schemes less than satisfactory for use in a comparable worth study.[12] Others have discussed these problems, which include possible sex biases in the description of jobs, the evaluation of jobs, and the determination of which job characteristics should be valued; the statistical reliability of rater's evaluations; and the correlation of job ratings (or the lack of such) across different evaluation schemes (see Treiman and Hartmann 1981; Schwab 1984). Nonetheless, as table 10.1 indicates, several states have already conducted formal job evaluation studies and used them to draw conclusions about whether their female employees are underpaid relative to their male employees whose jobs are evaluated to be of comparable worth.

The typical study used is based upon the *factor point method* (Treiman 1979). The characteristics of jobs are described and then a rater, or group of raters, assigns point scores to each job on a number of dimensions. In the widely used Hay Point System developed by Hay Associates, these dimensions include know-how, problem solving, accountability, and working conditions.[13] The points a job receives for each category are summed to get a total score, or measure of worth, for the job. The magnitudes of the wage adjustments required by a comparable worth policy are obtained by either directly computing how much less each female-dominated job pays than male-dominated jobs with the same total point score, or by estimating a wage equation in which male-dominated jobs' wages are specified to be a function only of their total point scores and then computing by how much wages in female-dominated jobs lie below this estimated equation.

This methodology raises two issues: First, how sensitive are the estimates of the individual occupational "comparable worth gaps," and the average gap across occupations, to different functional form assumptions about the male wage equation. If functional form assumptions influence the results, careful consideration must be given to functional form and methods to "statistically" choose the correct form used (see Box and Cox 1964, for example).

Second, is it reasonable to sum the individual factor point scores to get a total score? To do so implies that the marginal value a governmental unit gets from an additional point is the same across factors. A more general approach would be to estimate hedonic wage equations in which the wage in a male-dominated occupation was specified to be a function of the individual factor point scores in the occupation; the resulting regression coefficients would be estimates of the marginal value the government unit placed on an additional point on each factor. If the marginal effects of factor points on salaries differ across factors *and* if male and female jobs with the same total factor point scores have a different distribution of individual factor point scores, then basing comparable worth gap estimates solely on total Hay points may lead to erroneous conclusions.[14]

This section uses data from job evaluation studies conducted in Minnesota, Washington, and Connecticut to see how robust these studies' results are to these modifications. Our calculations are meant to be illustrative; the specific estimates we obtain of comparable worth gaps may differ from those the studies themselves found because of differences in the samples we use and the functional form assumptions we make.

10.3.1 Minnesota

Minnesota is one of the few states that has actually begun to implement comparable worth pay adjustments for its employees. A Council on the Economic Status of Women that had been monitoring the status of state-employed women since 1976 found in 1981 that state job classifications remained heavily segregated by sex, that female employees tended to be overrepresented in low-paying clerical or service occupations, and that the gap between average earnings of state-employed males and females was almost $5,000. This led the council to establish a Task Force on Pay Equity to examine salary differences between male and female jobs.

The state of Minnesota, in conjunction with Hay Associates, had begun in 1979 an evaluation of all state government jobs. Each position was awarded Hay points in the four areas previously mentioned, as well as a total Hay point score. These evaluations were used by the task force, which conducted analyses of the maximum monthly salary for 188 positions in which at least ten employees were employed and which could be classified as either male (at least 70 percent male incumbents) or female (at least 70 percent female incumbents) positions. These analyses were primarily visual inspections of scattergrams; they concluded that in almost every case with equal total Hay point scores (see Council on the Economic Status of Women 1982), the pay for female jobs was less than the pay for male jobs. In most cases, female jobs also received lower pay than male jobs with lower Hay point totals. Estimates of the cost of implementing pay equity, by raising salaries in each of the female-dominated classes to the lowest (highest) salary of a male-dominated class with the same number of Hay points (or the next-lowest-rated male job when no male job with the same number of points existed) were calculated as ranging from 2 percent to 4 percent of the total salary base, or \$20 million to \$40 million.

Salaries of state employees in Minnesota are determined, for the most part, through collective bargaining. After reviewing these findings, and conducting some analyses of their own, the state of Minnesota appropriated a total of \$22 million and distributed this sum among the various bargaining units, in proportion to their payrolls in the female-dominated classes.[15] Each unit then bargained with the state over which specific occupation titles would receive comparable worth wage adjustments from these funds. The adjustments were paid in two stages (over \$7 million in July 1983 and over \$14 million in July 1984). Although in practice only the "female-dominated" occupations have received such adjustments, nothing in the law restricts comparable worth adjustments to these classes. The law requires that reanalyses and reevaluations of the need for additional comparable worth adjustments be undertaken every two years, and a commitment has been made to fund additional adjustments during the 1985–87 period.

The data from Minnesota are a convenient place for us to start, both because the Hay point system is one of the (if not *the*) most widely used job evaluation systems in the country and because Minnesota has already begun to implement comparable worth adjustments based partially on the original study. We obtained data from the original study, as of October 1981, for 188 job titles, on the number of incumbents (n_i), the percentage female (FEM_i), the total Hay Point Score (HPT_i) and the maximum monthly salary for the class (S_i).[16] The state of Minnesota Department of Employee Relations also provided us with a computer printout that listed, as of November 1983, the individual factor point scores (know-how, $HP1_i$; problem solving $HP2_i$; accountability, $HP3_i$; and working conditions, $HP4_i$) for every state occupation title (Minnesota, Department of Employee Relations 1983). Of the 188 job titles in the original study, we were able to match factor job point scores to 150 job titles, and this subset of job titles became the sample we used in our analysis.[17]

Table 10.3 presents some descriptive statistics from the factor point score data that highlight a number of points. First, on average, male jobs were more highly rated than female jobs. Second, average point scores and the range of variation of point scores for the first three factors far exceed the comparable variables for the fourth factor (working conditions). Indeed, the small range of variation in this factor, the large number of observations that have zero scores for it, and its small maximum value in the sample of 29, as compared to a maximum of 400 for know-how points, reinforces the notion that one cannot simply add all factor point scores together to get a total score.[18] Third, focusing on the individual factor point scores as a share of total Hay points, there are differences by sex; female jobs rank relatively high on the first (know-how) factor and relatively low on all other factors.

Finally, and perhaps most important, in these Minnesota data there actually are not four truly independent job factors.[19] The bottom panel of table 10.3 presents a correlation matrix of the individual factor point scores and the total Hay Point Score; it is striking that the correlations among the first three factors' scores and between each of them and the total scores all exceed .94. Only the relatively unimportant (in magnitude) working condition score is at all orthogonal to, or relatively uncorrelated with, the other factor scores. These results suggest that with these Minnesota data it will be difficult to disentangle the marginal effects on wages of individual factor points and that wage equations using the total factor point scores as the sole explanatory variable are unlikely to yield results very different from those that use the individual factor point scores.

These conjectures are borne out in tables 10.4 and 10.5. Table 10.4 presents estimates separately for the male and female occupations of monthly maximum occupational salary equations of the form

(1) $S_i = \alpha_0 + \alpha_1 HPT_i + \epsilon_1;$

(2) $S_i = B_0 + B_1 HP1_i + B_2 HP2_i + B_3 HP3_i + B_4 HP4_i + \epsilon_i;$

(3) $S_i = \gamma_0 + \gamma_1 HP4_i + \gamma_2 HP5_i + \epsilon_i$
$(HP5_i = HP1_i + HP2_i + HP3_i).$

Here ϵ_i is a random error term, and we have progressively regressed monthly salaries on total Hay points, the four individual factor point scores, and the fourth factor point score plus the sum of the first three. To see whether the results are sensitive to functional form assumptions, a second set of estimates in table 10.4 (equations 4–6) use the logarithm

Table 10.3 Descriptive Statistics, Minnesota Data

	Male Jobs (N = 102)				Female Jobs (N = 48)			
	Mean	(Std. Dev.)	Min.	Max	Mean	(Std. Dev.)	Min.	Max.
HP1	168.7	(63.3)	76	400	118.8	(40.3)	66	230
HP2	50.9	(33.5)	10	200	27.6	(18.1)	8	87
HP3	60.7	(41.0)	16	264	32.7	(20.1)	12	100
HP4	5.4	(7.2)	0	29	1.4	(3.4)	0	14
HP1F	.608	(.043)			.677	(.052)		
HP2F	.164	(.036)			.141	(.030)		
HP3F	.197	(.039)			.171	(.027)		
HP4F	.030	(.041)			.010	(.026)		

Correlation Matrices

	Male Jobs				Female Jobs			
	HP1	HP2	HP3	HP4	HP1	HP2	HP3	HP4
HP1	1.00				1.00			
HP2	.98	1.00			.99	1.00		
HP3	.94	.97	1.00		.97	.97	1.00	
HP4	−.60	−.58	−.52	1.00	−.24	−.21	−.19	1.00
HPT	.99	.99	.98	−.55	.99	.99	.98	−.18

Sources: Authors' calculations from data in Council on the Economic Status of Women 1982; Minnesota, Department of Employee Relations 1983.

Notes: HP1 = know how points; HP2 = Problem-solving points; HP3 = accountability points; HP4 = working condition points; HPT = total Hay points; HPJF = share of category *J* points in total Hay points.

Table 10.4 **Estimated Comparable Worth Salary Equations, Minnesota Data (absolute value t = statistics)**

Explanatory Variables	Monthly Maximum Salary				Log of Monthly Maximum Salary[a]			
	(1)	(1a)	(2)	(3)	(4)	(4a)	(5)	(6)
Male equations (N = 102)								
C	1012.06 (40.7)	1019.03 (39.6)	803.33 (6.0)	1009.49	710.443 (320.4)	710.797 (327.7)	685.388 (101.2)	712.187 (230.8)
HPT	3.27 (25.3)	3.38 (25.6)			.155 (22.0)	.161 (22.7)		
HP1			5.75 (3.6)				.491 (6.0)	
HP2			2.47 (0.6)				−.328 (1.6)	
HP3			0.30 (0.2)				.037 (0.4)	
HP4			5.56 (1.9)	3.463 (1.1)			.194 (1.3)	.026 (0.2)
HP5				3.278 (21.1)				.151 (17.9)
PEM		−7.08 (2.7)				−.359 (2.4)		
R^2	.865	.873	.874	.865	.829	.839	.863	.830
Female equations (N = 48)								
C	732.60 (36.2)	883.87 (10.5)	669.68 (7.5)	729.09 (33.9)	677.680 (408.3)	691.921 (101.0)	660.206 (96.7)	677.293 (385.5)
HPT	3.50 (33.8)	3.47 (34.1)			.235 (27.7)	.232 (28.1)		
HP1			4.61 (3.0)				.538 (4.7)	
HP2			3.52 (1.0)				−.161 (0.6)	
HP3			1.29 (0.7)				−.012 (0.1)	
HP4			5.51 (2.2)	4.76 (2.0)			.516 (2.7)	.373 (1.90)
HP5				3.51 (33.1)				.235 (27.2)
PEM		−1.61 (1.8)				−.152 (2.1)		
R^2	.962	.964	.963	.961	.944	.948	.953	.945

Notes: C = intercept; HPT = total Hay points; HP1 = know-how points; HP2 = problem-solving points; HP3 = accountability points; HP4 = working condition points; HP5 = HP1 + HP2 + HP3; PEM = percent female employees.

a. All coefficients in log salary equations have been multiplied by 100.

Table 10.5 Estimates of Percentage of Comparable Worth Gap for Minnesota Data, Using Alternative Estimation Methods

	D_1	D_2	D_3	D_4	D_5	D_6
Mean percentage gap	−16.8	−18.5	−14.6	−16.1	−16.7	−20.0
Correlation of differentials across 48 female job classes						
D_1		.97	.93	.98	.99	.97
D_2			.82	.94	.97	.99
D_3				.93	.93	.81
D_4					.98	.95
D_5						.97

Notes: Differentials are computed for each female job class using Hay Point Score for the class and the coefficients from the male wage equations in table 10.4. D_1 uses equation (1); D_2 uses equation (4); D_3 uses equation (2); D_4 uses equation (5); D_5 uses equation (3); D_6 uses equation (6).

of monthly salary as the dependent variable; this is obviously only one of many nonlinear functional forms with which one might experiment.

Because of the severe collinearity problems, the results in table 10.4 should not be stressed too heavily. They do suggest, however, that the implicit weights assigned to individual factor point scores by the collective bargaining process differ across factors. For example, columns (2) and (5) suggest that only the first and last factor point scores significantly affect wages.[20]

What are the magnitudes of the comparable wage gaps implied by the various estimates. That is, how sensitive are estimates of comparable wage gaps to the functional form used and to whether individual factor point scores or total Hay Point Scores are used in the analysis. For each female occupation, we can compute what the occupation would have been paid if it had been paid according to a given male wage equation. The resulting percentage underpayment figures weighted by the number of employees in the occupation can then be aggregated across occupations to come up with a mean (over the female occupations) comparable worth wage gap estimate.

These estimates are presented in the top row of table 10.5 for six specifications of the male wage equation; they vary between −14.6 percent and −20.0 percent, a range that might be considered sufficiently narrow to be useful for public policy. Moreover, as the bottom rows of the table suggest, the relative ranking of which female occupations are the most underpaid appears to be insensitive to the estimation method used. The correlation across female occupations of the various estimated wage gaps is at least .81. Thus, the various methods yield very similar estimates about which of the female occupational classes should receive the largest comparable worth adjustments.

In sum, the estimates of comparable worth gaps implied by the Minnesota data were relatively insensitive to the functional forms used and to the use of individual factor point scores instead of total Hay points. As we shall see, this result is also characteristic of the other two data bases we examine in this section. Because the results for the three states are so similar, our discussions of the Washington and Connecticut data are relatively brief.

10.3.2 Washington

Washington was the first state to undertake a formal factor point job evaluation study,[21] with the explicit objective of comparing salaries on male-dominated (more than 70 percent male) and female-dominated (more than 70 percent female) jobs. The study was conducted in 1974 by the Willis consulting firm and covered 121 job classifications. Its major conclusion was that female-dominated jobs tended to pay some 20 percent less than comparable-valued male jobs. The study was updated in 1976 and additional job categories surveyed. The failure of the governor and state legislature to implement the type of wage adjustments called for by the study led to the litigation that resulted in a December 1983 federal district court order mandating implementation of these adjustments (*AFSCME v. State of Washington*). This decision was reversed by a federal appeals court, but the parties agreed through collective bargaining to implement comparable worth wage adjustments beginning in 1986.

The Willis job evaluation system is similar to the Hay system and awards points to jobs on the dimensions knowledge and skill, mental demands, accountability, and working conditions.[22] Table 10.6 contains descriptive statistics from the factor point scores for the 121 occupations in the original Willis study. While in this sample female-dominated jobs tend to have higher ratings than male jobs, most other patterns are similar to those found in the Minnesota data. Again, the fourth factor (working conditions) has a very small range of variation relative to the other factors and the other three factors are very highly correlated. So, as with the Minnesota data, there are really only two independent dimensions of jobs actually being evaluated by the Willis system, and one, working conditions, is obviously measured with considerable error.

Table 10.7 contains estimates of minimum salary equations similar to those presented earlier for Minnesota.[23] Maximum salary and midpoint of the occupation's salary range were also available to us; because similar results were obtained when they were used as the dependent variable, these equations are omitted for brevity. Based upon these estimates and those in table 10.7, along with the factor point scores of

Table 10.6 Descriptive Statistics, Washington Data

	Male (N = 63)				Female (N = 58)			
	Mean	Std. Dev.	Min.	Max.	Mean	Std. Dev.	Min.	Max.
WIL1	115.0	46.7	61.0	244.0	143.8	59.1	61.0	280.0
WIL2	32.7	24.1	8.0	106.0	42.8	34.0	8.0	140.0
WIL3	38.8	28.9	11.0	140.0	49.5	37.1	11.0	160.0
WIL4	8.7	5.2	0.0	20.0	4.4	5.4	0.0	17.0
WIL1F	.610				.616			
WIL2F	.150				.165			
WIL3F	.180				.194			
WIL4F	.059				.024			

Correlation Matrices

	Male Jobs				
	WIL1	WIL2	WIL3	WIL4	WILT
WIL1	1.0				
WIL2	.98	1.0			
WIL3	.96	.96	1.0		
WIL4	−.48	−.49	−.43	1.0	
WILT	.99	.99	.98	−.43	1.0

	Female Jobs				
	WIL1	WIL2	WIL3	WIL4	WILT
WIL1	1.0				
WIL2	.99	1.0			
WIL3	.95	.94	1.0		
WIL4	−.07	−.09	−.11	1.0	
WILT	.99	.99	.97	−.05	1.0

Source: Authors' calculations from data in Norman D. Willis and Associates 1976 and private correspondence from Helen Remick (Feb. 3, 1984) indicating which occupations were male (or female) dominated.

Notes: WIL1 = knowledge and skill points; WIL2 = mental demands points; WIL3 = accountability points; WIL4 = working condition points; WILT = total Willis points; WILJF = share of category *J* points in total Willis points.

the female occupations, one can compute a set of estimated comparable worth gaps for each occupation as before.

Estimates of the unweighted mean percentage wage gaps are found in table 10.8.[24] The range is even narrower here than it was in the Minnesota data, varying from 21.9 percent to 23.1 percent when the minimum salary data are used. Moreover, the correlation across estimation methods of the estimated individual female occupational gaps is again very high, exceeding .89 in all cases. The estimated comparable

Table 10.7 Estimated Comparable Worth Minimum Salary Equations, Washington Data (absolute value t-statistics)

Explanatory Variables	Minimum Salary			Log of Minimum Salary[a]		
	(1)	(2)	(3)	(4)	(5)	(6)
Male equations (N = 63)						
C	443.35 (14.2)	462.76 (4.7)	447.01 (8.9)	621.67 (151.0)	620.92 (47.5)	620.68 (93.8)
WILT	1.57 (10.9)			.193 (10.2)		
WIL1		.91 (0.6)			.152 (0.7)	
WIL2		7.29 (2.2)			.761 (1.7)	
WIL3		−2.05 (1.2)			−.203(−0.9)	.269 (0.7)
WIL4		2.80 (.93)	1.29 (0.4)		.431 (1.1)	.194 (9.2)
WIL5			1.57 (9.8)			
R^2	.662	.693	.662	.629	.651	.629
Female equations (N = 58)						
C	352.82 (16.1)	252.60 (3.6)	370.46 (15.8)	602.64 (198.4)	582.36 (62.7)	605.22 (187.0)
WILT	1.26 (15.1)			.177 (15.4)		
WIL1		3.32 (2.9)			.576 (3.8)	
WIL2		−1.37 (0.8)			−.338 (1.4)	
WIL3		.33 (0.4)			.003 (0.0)	
WIL4		−2.96 (2.0)	−2.37 (1.2)		−.469 (1.8)	−.356 (1.3)
WIL5			1.25 (15.4)			.176 (15.7)
R^2	.804	.826	.815	.809	.842	.821

Sources: Norman D. Williams and Associates 1976; Washington, Department of Personnel 1974; private correspondence from Helen Remick (Feb. 3, 1984).

Notes: C = intercept; WILT = total Willis points; WIL1 = knowledge and skill points; WIL2 = mental demand points; WIL3 = accountability points; WIL4 = working condition points; WIL5 = WIL1 + WIL2 + WIL3.

[a]All coefficients in log salary equations have been multiplied by 100.

Table 10.8 **Estimates of the Unweighted Mean Percentage Comparable Worth Gap for Washington Data, Alternative Estimation Methods**

	Mean Percentage Gaps		
Method	(A) Minimum Salary	(B) Maximum Salary	(C) Midpoint Salary
D_1	23.1	22.5	23.2
D_2	21.9	22.7	23.6
D_3	22.5	22.8	23.7
D_4	22.8	22.5	22.3
D_5	21.9	22.9	22.8
D_6	22.2	23.0	23.9

Correlation Matrix of Wage Gap Estimates

	D_1	D_2	D_3	D_4	D_5	D_6
D_1		.95	.96	.96	.89	.90
D_2			.98	.92	.95	.95
D_3				.92	.92	.95
D_4					.95	.96
D_5						.99

Notes: The differentials at the minimum salary level are computed for each female job class in method D_j ($j = 1$ to 6) using the Willis Point Scores for the class and the coefficients from the male wage equations in column j of table 10.7. Analogous computations are done for the maximum and midpoint salary levels using coefficients from male maximum and midpoint salary level equations, which are specified similarly to those in table 10.7.

worth gaps are again relatively insensitive to the functional form and the decomposition of the factor point scores used.

10.3.3 Connecticut

At the directive of the state legislature, Willis Associates was hired to undertake a pilot job evaluation study of some 120 state occupations in 1979–80.[25] The study covered male-dominated, female-dominated, and mixed (30 percent to 70 percent male) occupations and was similar to the one Willis conducted for Washington. It concluded that female-dominated jobs were paid some 10 percent to 20 percent less than male jobs with comparable levels of Willis points in the sample.

Based upon this and subsequent students, a decision was made to undertake a comprehensive evaluation of all state positions. The resulting job evaluation data will be provided to state employee unions, which can use it in future negotiations over wage scales. Although the state may consider comparable worth in framing its bargaining position, it will continue to consider a number of additional criteria, including market conditions. As of 1983 the comprehensive evaluation had not yet been completed, but the state had already agreed (in negotiations with three unions whose members were primarily females) to set aside 1 percent to 2 percent of payroll per year into a fund that would eventually be used to finance individual inequity adjustments.

Tables 10.9, 10.10, and 10.11 provide estimates similar to those obtained for the other states, using data from the Willis study for eighty-four occupations that were either male or female dominated. The descriptive statistics in table 10.9 confirm by now familiar patterns; little variation in working condition points relative to other factors, differential weighting by sex of the importance of the different factors in the total score, and the extremely high correlation of the first three factors. The latter again suggests there are only two real factors—working conditions and everything else.

Table 10.10 presents estimates of male and female average annual salary equations.[26] These estimates strongly suggest (at least for males) that different weights should be applied to the different factors; indeed, working conditions receives a negative weight in the male equations.[27] Based upon these estimates, one can again estimate the mean comparable worth gap generated by each method, as well as the correlation of the gap estimates for individual occupations across methods; these are found in table 10.11. The mean percentage gap estimate ranges between 15.4 percent and 20.2 percent, which is broader than the Washington range but about the same range as found in the Minnesota data. The correlation of the individual occupational wage gap estimates across estimation methods, although high, is not as high as before; for these data we observe correlations as low as .73.

10.3.4 Summary

In sum, our analyses of data from the Minnesota, Washington, and Connecticut comparable worth job evaluation studies suggest that in these three cases estimates of the average differential, or the ranking of differentials across occupations, are not very sensitive to which functional form was used or whether total job points are decomposed into their individual factor point scores. While these results should be gratifying to proponents of comparable worth, we stress that they hold for particular samples of data. It is incumbent upon future studies of other governmental units to perform sensitivity analyses of the type we have undertaken here.[28]

10.4 Occupational Mobility

Total compensation on a job includes both pecuniary and nonpecuniary forms of compensation. The previously mentioned studies focus on wages and working conditions—the latter obviously poorly measured by the various evaluation systems. Fringe benefits tend to be

Table 10.9 Descriptive Statistics, Connecticut Data

	Male (N = 43)				Female (N = 41)			
	Mean	Std. Dev.	Min.	Max.	Mean	Std. Dev.	Min.	Max.
WIL1	118.16	32.05	61.0	184.0	107.02	36.01	61.0	212.0
WIL2	32.37	17.60	8.0	70.0	26.29	17.78	8.0	92.0
WIL3	42.14	20.11	11.0	80.0	36.21	23.61	11.0	122.0
WIL4	8.19	6.03	0.0	17.0	4.07	5.87	0.0	17.0
WILT	200.88	67.74	91.0	336.0	173.36	77.01	91.0	437.0
WIL1F	.603				.639			
WIL2F	.150				.140			
WIL3F	.200				.195			
WIL4F	.047				.028			

	Correlation Matrices							
	Male Jobs				Female Jobs			
	WIL1	WIL2	WIL3	WIL4	WIL1	WIL2	WIL3	WIL4
WIL1	1.00				1.00			
WIL2	.95	1.00			.97	1.00		
WIL3	.95	.95	1.00		.95	.98	1.00	
WIL4	−.20	−.24	−.12	1.00	.04	.05	.04	1.00
WILT	.98	.97	.98	−.10	.99	.99	.98	.11

Sources: Authors' calculations from data in Norman D. Willis and Associates 1980.

Notes: WIL1 = knowledge and skill points; WIL2 = mental demand points; WIL3 = accountability points; WIL4 = working condition points; WILT = total Willis points; WILJF = share of category *j* points in total Willis points.

Table 10.10 Estimated Comparable Worth Salary Equations, Connecticut Data (absolute value t-statistics)

	Annual Salary			Log of Salary[a]		
	(1)	(2)	(3)	(4)	(5)	(6)
Male equations (N = 43)						
C	7892.191 (9.8)	7915.740 (5.1)	9370.069 (12.0)	910.953 (169.9)	909.185 (89.5)	920.772 (177.3)
WILT	32.916 (8.6)			.226 (8.9)		
WIL1		58.011 (2.4)			.427 (2.7)	
WIL2		22.515 (0.4)			.051 (0.2)	
WIL3		−2.513 (0.1)			.028 (0.1)	
WIL4		−108.585 (2.7)	−116.299 (3.1)		−.736 (2.8)	−.764 (3.1)
WIL5			31.590 (9.7)			.217 (10.0)
R^{-2}	.637	.732	.737	.653	.746	.748
Female equations (N = 41)						
C	7379.954 (18.3)	6851.129 (6.2)	7350.930 (17.7)	900.923 (259.1)	891.796 (95.6)	900.783 (252.1)
WILT	24.722 (11.6)			.196 (10.7)		
WIL1		34.716 (1.8)			.369 (2.3)	
WIL2		34.403 (0.6)			.105 (0.2)	
WIL3		2.142 (0.1)			.001 (0.0)	
WIL4		28.755 (1.0)	28.938 (1.0)		.195 (0.8)	.191 (0.8)
WIL5			24.756 (11.4)			.197 (10.5)
R^{-2}	.769	.756	.765	.738	.731	.733

Source: Norman D. Willis and Associates 1980.

Notes: C = intercept; WILT = total Willis points; WIL1 = knowledge and skill points; WIL2 = mental demand points; WIL3 = accountability points; WIL4 = working condition points; WIL5 = WIL1 + WIL2 + WIL3.

[a]All coefficients in the log salary equations have been multiplied by 100. The salary figures are for step 4 of the applicable salary ranges.

Table 10.11 Estimates of Percentage of Comparable Worth Gap for Connecticut Data, Alternative Estimation Methods

	D_1	D_2	D_3	D_4	D_5	D_6
Mean Percentage Gap	−15.4	−15.4	−19.6	−19.4	−20.2	−19.3
Correlation of differentials across 41 female job classes						
D_1		.98	.79	.84	.79	.84
D_2			.73	.81	.75	.83
D_3				.98	.98	.95
D_4					.98	.98
D_5						.98

Notes: The differentials are computed for each female job class using the Hay Point Scores for the class and the coefficients from the male wage equations in table 10.10. D_j uses equation j for j = 1 to 6.

ignored because most individuals employed in a bargaining unit presumably receive the same package of benefits, although some benefits may vary with seniority and rank.

Another, possibly important omission is the studies' failure to include opportunities for occupational mobility and subsequent wage growth. If male workers in government have fewer opportunities for occupational mobility than female workers, the observed current wage gaps of the previous section may merely be compensating wage differentials and would not call for any comparable worth adjustments. In contrast, if female employees have fewer opportunities for occupational mobility, the observed current wage gaps may understate the extent to which females are underpaid.

Testing for gender-related differences in occupational mobility in the sector requires longitudinal earnings data and current job evaluation scores for a sample of male and female public employees. Such data is not readily available. However, it is possible to provide evidence that suggests, using data from the 1/100 sample of the 1970 *Census of Population*. We illustrate how this can be done with data from New York State.

The 1970 *Census of Population* includes information on an individual's industry and occupation in both 1965 and 1970, his or her 1969 earnings level, and his or her employment as a state or local government worker in 1970. If one assumes that government employees who remained in the same three-digit industry between 1965 and 1970 were also government employees in 1965, then we may focus on this group's occupational mobility.[29] Mean earnings in 1969 by three-digit public sector occupation can be constructed from the census data, and then the ratio of 1969 mean earnings in an individual's 1970 occupation to 1969 mean earnings in an individual's 1965 occupation can be used to measure occupational mobility.[30]

Table 10.12 presents the results of regressions in which the logarithm of this variable is regressed on a dichotomous variable indicating whether the individual is a state or a local government worker, the individual's age (as of 1975), the logarithm of the 1969 mean earnings in his or her 1965 occupation (to control for initial job level), weeks-worked intervals for 1969 (as a measure of labor market attachment), and the individual's sex. These results suggest that, as defined, occupational mobility is lower for state employees than for local employees. The results also suggest that occupational mobility declines with age over the relevant age range, is lower for individuals initially working in high-earnings occupations, and is lower for individuals with weak labor force attachment. Crucially, it is also lower for females than for males.[31]

Although our data are crude, this latter result suggests that observed male/female earnings differentials for jobs with equal job evaluation

Table 10.12 Determinants of Relative Occupational Mobility over the 1965–70 Period for SLG Employees in New York State (absolute value of t-statistic)

	RL1	
	(1)	(2)
C	.476 (11.9)	.488 (12.1)
STATE	−.013 (3.0)	−.013 (2.9)
AGE	−.003 (2.1)	−.003 (2.2)
AGE^2	.002 (1.6)	.003 (1.7)
LM65	−.083 (14.5)	−.086 (14.9)
WORK1		−.023 (2.7)
WORK2		.012 (2.3)
WORK3		.009 (1.1)
SEX	−.019 (4.8)	−.020 (4.7)
R^2	.044	.047

Source: Author's calculations from data from the 1/100 sample for New York State of the *1970 Census of Population*. The analyses are confined to individuals ages 20 to 70 in 1970, who were SLG employees in both years, and who worked at least 27 weeks in 1969. Of this group, roughly 16 percent changed three-digit occupations between 1965 and 1970, so in 84 percent of the cases LR1 takes on the value of zero.

Notes: N = 4,944 for all equations. AGE^2 coefficients have been multiplied by 100. C—intercept term; STATE—1 = state employee, 0 = local government employee; AGE—individual's age; AGE^2—age squared; LM65—logarithm of mean earnings of SLG employees in New York State in 1969 in the individual's 1965 three-digit occupation; WORK1—1 = work 27–39 weeks in 1969, 0 = other; WORK2—1 = work 40–47 weeks in 1969, 0 = other; WORK3—1 = work 48–49 weeks in 1969, 0 = other (omitted category is work 50–52 weeks in 1969); SEX—1 = female, 0 = male; LR1—log of the ratio of mean earnings of SLG employees in New York State in 1969 in the individual's 1970 three-digit occupation to mean earnings of SLG employees in 1969 in the individual's 1965 three-digit occupation.

scores probably are not compensating earnings differentials for better female occupational mobility prospects. Indeed, these results suggest that the male/female comparable worth gap may be larger than has been estimated by the analyses in the previous section. As noted above, however, precise tests would require much more detailed data.[32]

10.5 Employment Adjustments

As noted in the introduction, CWWA would likely alter at least four types of relative prices that public employers face. First, for any given function (e.g., police) and within any major occupational group, the average wage of female employees would rise relative to the average wage of male employees, as some female employees received CWWA. Second, across major occupational groups, the average wage of employees in heavily "female" occupations would rise relative to the average wages of employees in heavily "male" occupations, as more employees in the former would receive CWWA. Third, across functions, the average wage in heavily female-dominated functions would rise relative to the average wage in heavily male-dominated functions, as employees in the former would again be more likely to receive CWWA. Finally, the average wage of public employees would rise relative to the prices of other goods and services.

To the extent that public employers' employment decisions are sensitive to their employees' wage rates, these changes should lead respectively to the substitution of some male for some female employees within a function-occupation group, the substitution of some employment in male-dominated occupations for some employment in female-dominated occupations (within a function), the substitution of some employment in male-dominated functions for some employment in female-dominated functions, and a decline in the aggregate level of public employment. For all these reasons, CWWA should lead to a decline in female employment.

This section reports our attempts to estimate the extent to which some of these adjustments might occur and then to simulate the potential employment effects of a CWWA. Unfortunately, data are not currently available to us on a *detailed* function by occupation by sex breakdown, so the estimates discussed typically aggregate employees across occupations within a function, or across functions within an occupation.[33] These types of aggregations make it difficult to estimate substitution elasticities.

Published data permit us to estimate the extent to which the ratio of male to female public administration employees varies across standard metropolitan statistical areas (SMSAs) with the ratio of male to female earnings in the industry. Public administration workers are employed in executive and legislative offices; general government (not elsewhere classified); justice, public order, and safety; and the administration of various government programs. While many government workers are employed in these categories, public administration does not include a number of governmental functions, such as hospitals and education. As a result the category represents less than half of all state and local government employment.[34]

Table 10.13 presents estimates based on published SMSA-level data from the 1970 and 1980 *Census of Population* volumes. In each case the logarithm of the ratio of male to female public administration employees (LRE) is regressed on the logarithm of the ratio of male public administration employees' median earnings to female public administration employees' median earnings (LRW), the logarithm of total public administration employment (LT), and the logarithm of the ratio of the male to female labor force (LRL). The latter two variables are included as crude controls for differences in the occupational mix and male/female public administration applicant ratio across SMSAs.

Columns (1) and (2) report estimates based on the 1980 data; it is not possible to separate federal employees from state and local employees in these data, and total government figures are used. While as expected the sex ratio in the labor force is positively related to the sex ratio in government employment, the latter is also positively associated with the sex ratio in wages in that year. That is, there is no evidence in the 1980 data that higher female wages are associated with lower female employment levels.

In contrast, the 1970 data suggest that the association between male/female employment and wage ratios is negative (col. 3). However, this appears to be true primarily for federal employees (col. 4), where a 10 percent increase in the male/female wage ratio is associated with an 8 percent decrease in the employment ratio. State and local government employees (col. 5) display no such association.

The difference in results between the 1970 and 1980 data is puzzling. One possible explanation is that it is due to different SMSAs being included in each year's sample. When the 1980 equations are reestimated on the subsample of 118 SMSAs that appeared in the 1970 sample, however, one still observes a positive relative wage coefficient (see table 10.13, note a). Attempts to appeal to omitted variable bias also did not prove fruitful, as when a fixed effects model was estimated using data from both years (col. 5), no significant coefficients were obtained.

Independent of the results, these analyses of the published census data are unsatisfactory for a number of reasons. They permit only the crudest control for differences in the occupational mix across areas. They contain no information on the characteristics of male and female employees that might affect their relative productivity (e.g., education

Table 10.13 **Male/Female Public Administration Relative Employment Equations: 1970 and 1980 *Census of Population*, SMSA-Level Data (absolute value of t-statistic)**

	1980 Data		1970 Data			1970 and 1980 Data
	LRE801 (1)	LRE802 (2)	LRE701 (3)	LRE703 (4)	LRE704 (5)	ΔLRE1 (6)
C	.201 (0.6)	.533 (2.1)	1.352 (4.2)	.686 (2.0)	1.754 (4.0)	−.448 (4.1)
LRW801	.705 (2.3)[a]					
LRW802		.819 (2.7)[a]				
LRW701			−.488 (1.8)			
LRW703				−.811 (3.2)		
LRW704					−.059 (0.1)	
ΔLRW1						−.229 (0.7)
LT801	−.040 (1.4)	−.051 (2.2)				
LT701			−.075 (2.8)			
LT703				−.017 (0.6)		
LT704					−.114 (2.9)	
ΔLT1						.128 (1.2)
LRL80	.646 (1.8)	.811 (3.1)				
LRL70			.853 (2.8)	1.260 (3.4)	.278 (0.7)	
ΔLRL						.234 (0.5)
R^2	.107	.170	.149	.135	.083	.021
N	148	148	118	118	118	118

Notes: LRE_{ij}—logarithm of the ratio of male to female public administration employees in the SMSA; *i*—80 (1980) or 70 (1970); *j*—1 = all public administration employees, 2 = full-year public administration employees, 3 = all federal public administration employees, 4 = all state and local public administration employees; LRW_{ij}—log of the ratio of male public administration employees' median earnings to female public administration employees' median earnings; LT_{ij}—log of total public administration employment in the SMSA; LRL_i—log of the ratio of the male to female labor force in the SMSA; Δ—1980 value of the variable minus 1970 value of the variable.

a. When estimation was restricted to the sample of 118 SMSAs that were present in the 1970 data, the LRW801 (LRW802) coefficient fell to .684 (.600) with a t-statistic of 1.8 (1.7).

Sources: Author's calculations from data in:
(1) *1980 Census of Population: Characteristics of the Population: Detailed Population Characteristics* (individual state volumes, Tables 120, 231);
(2) *1972 City and County Data Book* (Table 3);
(3) *1970 Census of Population: Characteristics of the Population: General Social and Economic Characteristics* (individual state volumes, Tables 188, 189).

and age) and hence relative employment levels. They do not permit us to separate state from local employees. Finally, they cover only a small fraction of all state and local government employees.

Many of these problems can be remedied using individual data from the A sample of the 1980 *Census of Population*—a 5 percent sample for each state. We aggregated state employees' data by state and local government employees' data by SMSA to get samples of 49 and 177 observations respectively.[35] The data were stratified into education and noneducation employees, and within each of these "industries," into four occupational groups—professional and managerial employees (occupation codes 001–199); technical, sales, and administrative support employees (o.c. 203–389); service (including protective service) employees (o.c. 403–69); and all other employees, including crafters, repair persons, laborers, and transportation equipment operators (o.c. 473–889).

Suppose that *within* each of these occupational groups the quantity of labor services produced (L) is given by the constant elasticity of substitution function:

$$(4) \qquad L = A[\delta Q_M{}^{-B} + (1 - \delta)Q_F F^{-B}]^{-1/B}.$$

Where $Q_M(Q_F)$ is a measure of the quality of males (females) employed in the occupation. $M(F)$ is a measure of male (female) employment in the occupation and $A,B,$ and δ are parameters. If the only cost of labor is the wage rate, it is well known that cost minimization leads to the relative demand equation

$$(5) \qquad \log (M/F) = a_0 + a_1 \log (W_M/W_F) + a_2 \log (Q_M/Q_F),$$

where $W_M(W_F)$ is the male (female) wage and a_1 is an estimate of minus the elasticity of substitution between males and females in the occupation.

Table 10.14 presents estimates of this relative demand equation for state employees for each of the four occupational groups in education and noneducation. Equations are estimated with both relative employment and relative person hours as the dependent variable. Each equation includes the logarithm of male to female earnings in the industry-occupation cell (LR2) and, as proxies for the relative quality of males and females in the occupation, the logarithms of the ratio of average age (LR4) and average education level (LR5) of males to females in the industry-occupation cell. In addition, to control for supply factors, some equations include the logarithm of a measure of the overall male/female wage ratio in the state (LZ1) and the logarithm of the male/female labor force ratio in the state (LZ2). We expect the former to be negatively and the latter to be positively associated with male/female relative employment in the industry-occupational cell.

Table 10.14 **Within-Occupation Relative Employment and Hours Equations: 1980 *Census of Population* State Employee Data, By State (absolute value t-statistics)**

	Noneducation				Education			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Employment								
LR3	.846 (1.3)	.387 (0.9)	−.383 (0.8)	−.429 (1.3)	1.503 (2.1)*	−.584 (1.8)*	.046 (0.1)	−.615 (2.0)*
LR4	−.118 (0.1)	−.154 (0.2)	.609 (0.8)	.678 (1.1)	1.581 (1.4)	−.699 (1.2)	.811 (1.4)	1.043 (2.2)*
LR5	.116 (0.1)	1.871 (1.6)	1.605 (1.6)	1.720 (2.6)*	3.532 (1.4)	.723 (0.5)	1.176 (1.1)	−.697 (0.7)
$\bar{R}^2$	.000	.036	.000	.077	.375	.129	.000	.120
LR3	.823 (1.5)	.224 (0.5)	−.154 (0.3)	−.431 (1.3)	1.393 (2.0)*	−.484 (1.5)	−.014 (0.0)	−.645 (2.0)*
LR4	−.308 (0.3)	−.313 (0.5)	.594 (0.8)	.801 (1.3)	1.740 (1.6)	−.673 (1.2)	.796 (1.4)	1.044 (2.1)*
LR5	−.761 (0.6)	1.267 (1.0)	1.829 (2.0)*	1.845 (2.8)*	2.603 (1.0)	1.128 (0.9)	1.261 (1.2)	−.748 (0.7)
LZ1	−1.284 (1.8)*	.097 (0.1)	−1.761 (1.8)*	−2.368 (1.8)*	.875 (0.9)	−1.184 (1.3)	−.066 (0.0)	.084 (0.0)
LZ2	1.628 (3.5)*	.678 (1.5)	−.601 (0.9)	1.522 (1.8)*	.622 (1.0)	1.127 (2.0)*	.352 (0.4)	−.379 (0.4)
$\bar{R}^2$	.185	.076	.149	.117	.420	.165	.000	.081
Hours								
LR3	.803 (1.2)	.390 (0.7)	−.047 (0.0)	−.660 (1.8)*	1.117 (1.5)	−.670 (2.2)*	−.193 (0.4)	−1.108 (2.6)*
LR4	.026 (0.0)	−.031 (0.0)	.647 (0.8)	1.108 (1.6)	1.918 (1.6)	−.135 (0.2)	1.218 (2.0)*	1.891 (3.0)*
LR5	.038 (0.0)	2.448 (1.8)*	2.110 (1.9)*	2.301 (3.2)*	4.759 (1.8)*	1.673 (1.4)	.842 (0.7)	−1.212 (0.8)
$\bar{R}^2$	.000	.041	.023	.141	.355	.088	.028	.221
LR3	.778 (1.4)	.152 (0.3)	.164 (0.3)	−.657 (1.8)*	.975 (1.4)	−.594 (1.9)*	−.239 (0.5)	−1.015 (2.3)*
LR4	−.179 (0.1)	−.218 (0.3)	.669 (0.9)	1.257 (1.9)*	2.125 (1.9)*	−.081 (0.2)	1.183 (1.9)*	1.905 (3.0)*
LR5	−.959 (0.7)	1.695 (1.2)	2.377 (2.3)*	2.425 (3.4)*	3.556 (1.4)	2.016 (1.7)*	.982 (0.8)	−1.310 (0.9)
LZ1	−1.359 (1.9)*	−.111 (0.1)	−2.013 (1.9)*	−2.758 (2.0)*	1.113 (1.2)	−.801 (0.9)	−.490 (0.4)	−1.614 (0.7)
LZ2	1.796 (3.8)*	1.010 (2.0)*	−.438 (0.6)	1.560 (1.7)*	.810 (1.3)	.990 (1.8)*	.581 (0.7)	.825 (0.6)
$\bar{R}^2$	.201	.109	.154	.181	.444	.114	.000	.195

Notes: (1) = professional and managerial employees; (2) = technical, sales and administrative support employees; (3) = service (including protective service) employees; (4) = other (including crafters, repairpersons, laborers, and transportation equipment operators) employees. LR3 = log of the ratio of average hourly earnings of male employees in the category to average hourly earnings of female employees in the category; LR4 = log of the ratio of the average age of males to the average age of females in the category; LR5 = log of the ratio of average education level of males to the average education level of females in the category; LZ1 = log of the ratio of male mean weekly earnings of full-year full-time workers in the state to female mean weekly earnings of full-year full-time workers in the state; LZ2 = log of the ratio of male civilian labor force in the state to female civilian labor force in the state.

*Statistically significant different from zero at .05 level; one-tail test.

Where significant, the control variables (LR4, LR5, LZ1, LZ2) all have the expected sign. Unfortunately, the evidence on the substitutability of males for females is much weaker. For noneducation, when relative employment is the dependent variable, there are no significant relative wage elasticities. When relative person hours (which probably is preferable) is used, male/female substitution appears to occur only in the "other" category, where a 10 percent increase in the wage ratio is associated roughly with a 6.5 percent decrease in the hours ratio. Elasticities in this range and larger are observed for state employees in education in the technical and administrative support and "other" categories. However, here seemingly perverse positive relative wage coefficients are found in the professional category.

Table 10.15 presents estimates of the relative wage coefficients from similarly specified equations for local government employees, with SMSAs as the units of observation. To avoid errors induced by averages constructed from very small samples, the analyses here are restricted to SMSAs in which at least four (or eight) individuals of each sex were contained in the data for each occupation-industry cell. While it would have been preferable to require a larger minimum number of observations in each cell, the tabulation of the resulting sample sizes from these restrictions, which is found at the bottom of table 10.15, suggests that even these restrictions substantially reduce the number of observations available.

The results in this table are not strongly supportive of the within-occupation male-female substitution hypothesis. There is some evidence for both education and noneducation that substitution takes place among technical and administrative support employees. However, for education employees, in some specifications relative wages are positively associated with relative employment levels for both the professional and "other" categories.

Taken together, the results in tables 10.14 and 10.15 are not strongly supportive of the hypothesis that within broad occupational groups male/female employment ratios are negatively associated with male/female wage ratios. Whether this result reflects the failure of substitution to exist, the presence of heterogeneity due to the use of broad occupational categories, or the omission of other important explanatory variables is unclear. Unfortunately, sample sizes within cells in these data are usually too small to permit tests of substitutability within finer occupational groups.

If one assumes that substitution between males and females is not possible within these broad occupational groups, one can aggregate across sexes within groups to come up with estimates of the average wage paid in each occupation (w_i). The data also permit the computation of the share of the payroll paid to each occupational group (S_i). One

Table 10.15 Within-Occupation Relative Employment and Hours Elasticities with Respect to Relative Wages: 1980 Census of Population Local Employee Data, by SMSA (absolute value t-statistics)

	Noneducation				Education			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Employment								
Aa	.089 (0.5)	−.296 (1.7)*	.169 (0.9)	−.186 (0.7)	.856 (2.1)*	−.074 (0.2)	.057 (0.3)	.296 (0.9)
Ab	.089 (0.5)	−.277 (1.7)*	.173 (1.0)	−.309 (1.1)	.725 (1.9)*	−.095 (0.3)	.060 (0.4)	.273 (0.9)
Ba	−.091 (0.5)	−.102 (0.4)	−.015 (0.0)	−.185 (0.5)	.737 (1.9)*	−.936 (1.8)*	.029 (0.1)	1.230 (3.0)*
Bb	−.135 (0.7)	.013 (0.0)	−.015 (0.0)	−.320 (0.9)	.606 (1.6)	−.951 (1.8)*	.028 (0.0)	1.211 (2.2)*
Hours								
Aa	−.044 (0.2)	−.239 (1.3)	.155 (0.3)	−.242 (0.9)	.535 (1.3)	−.117 (0.4)	.116 (0.7)	−.040 (0.1)
Ab	−.044 (0.3)	−.221 (1.3)	.150 (0.8)	−.382 (1.4)	.396 (1.0)	−.134 (0.4)	.116 (0.7)	−.059 (0.2)
Ba	−.199 (1.0)	.060 (0.2)	−.158 (0.5)	−.383 (1.0)	.417 (1.0)	−.981 (1.9)*	.097 (0.4)	.957 (2.5)*
Bb	−.240 (1.3)	.175 (0.7)	−.159 (0.5)	−.512 (1.4)	.278 (0.7)	−.983 (1.8)*	.096 (0.3)	.978 (2.5)*

Notes: A = confined to SMSAs with more than 4 males *and* 4 females in the occupation in the data; B = confined to SMSAs with more than 8 males and 8 females in the occupation in the data; a = logs of relative age and relative education levels also included in the analysis; b = logs of relative age, relative education levels, and male/female labor force ratio included in the analyses. Occupational categories are defined as in Table 10.14. The sample sizes are:

	Noneducation				Education			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
A	168	145	160	85	176	41	149	71
B	136	95	128	49	175	24	103	41

can thus estimate share equations (derived from translog expenditure functions) of the form

$$(6) \qquad S_i = \sum_{j=1}^{4} a_{ij} \log w_j, \qquad i = 1,2,3,4,$$

to test whether substitution of employees *across* occupations occurs in response to changes in wages in the different occupations.[36]

If such substitution occurs, given estimates of how CWWA would change the average wage in each occupation, one can then compute the resulting changes in factor shares and, holding the total employment budget constant, the change in total and female employment in each occupation. To these changes, one can add estimates of the employment changes caused by the response of the employment budget to the CWWA-induced change in the average wage in the sector and thus obtain an estimate of the overall effect of CWWA on female employment in the sector.

As is well known, the output constant own wage elasticity of demand (n_i) for each occupation is given by

$$(7) \qquad n_i = [\, a_{ii} + S_i^2 - S_i]/S_i,$$

and each of these elasticities should be negative (see Hamermesh 1986). In addition, to satisfy the homogeneity property—that a doubling of all wages would not alter the share spent on each occupation—it is necessary that

$$(8) \qquad a_{j1} + a_{j2} + a_{j3} + a_{j4} = 0 \qquad \text{for each } j.$$

Finally, to satisfy the symmetry property—that the Allen elasticity of substitution of occupation i for occupation j be equal to the elasticity of occupation j for occupation i—it must be the case that

$$(9) \qquad a_{ij} = a_{ji} \qquad \text{for all } i \neq j.$$

(See Hamermesh and Grant 1979). The restrictions summarized in equations (7) through (9) provide a convenient way of testing if the data are consistent with the share equations specified in equation (6).

Tables 10.16 and 10.17 provide estimates, for the state and local government samples respectively, of the occupational share equations derived from the translog expenditure function. In each case estimates are provided of the unconstrained system, of the system with homogeneity imposed, and of the system with both homogeneity and symmetry imposed. Since the four occupational shares must sum to unity, the coefficients of any wage variable must sum across equations in each system to zero. Hence, we infer the value of the coefficients of the last equation from estimates of the first three. The estimates are obtained

Table 10.16 Estimates of State Government Translog Cost Functions for State Major Occupation Group Data: Instrumental Variables (absolute value t-statistics)

	Education (n = 49)				Noneducation (n = 49)			
	LW1	LW2	LW3	LW4	LW1	LW2	LW3	LW4
I. No restrictions								
S1	.196 (0.7)	.034 (1.8)*	−.183 (1.0)	−.220 (1.0)	−.277 (0.1)	−1.802 (1.5)	1.367 (0.7)	−.067 (0.0)
S2	−.005 (0.0)	−.085 (0.7)	.022 (0.2)	.041 (0.3)	.212 (0.5)	.179 (0.6)	−.184 (0.4)	−.062 (0.3)
S3	−.136 (1.0)	−.201 (2.2)*	−.204 (2.4)*	.056 (0.6)	.549 (0.4)	1.209 (1.2)	−.922 (0.6)	−.038 (0.0)
S4	−.054	−.065	−.043	.123	−.484	.596	−.261	.167
II. Homogeneity								
S1	−.088 (0.5)	.340 (1.8)*	−.183 (1.0)	−.068 (0.3)	.934 (0.9)	−1.142 (1.2)	−.224 (0.5)	.432 (0.7)
S2	.052 (0.4)	−.085 (0.7)	.022 (0.2)	.010 (0.8)	−.012 (0.1)	.056 (0.3)	.112 (1.0)	−.155 (1.1)
S3	.027 (0 3)	−.201 (2.3)*	.204 (2.4)*	−.030 (0.4)	−.408 (0.6)	.506 (0.8)	.336 (1.0)	−.434 (1.0)
S4	.009	−.054	−.043	.088	−.538	.580	−.224	−.157
III. Homogeneity and symmetry								
S1	.045 (0.2)	.061 (0.5)	−.066 (1.0)	−.039 (0.8)	−.039 (0.1)	−.138 (0.7)	.052 (0.2)	.126 (0.8)
S2	.061 (0.5)	−.004 (0.0)	−.076 (1.3)	.202 (0.5)	−.138 (0.7)	.122 (0.7)	.017 (0.1)	−.001 (0.1)
S3	−.066 (1.0)	−.079 (1.3)	.201 (4.1)*	−.057 (1.7)*	.052 (0.2)	.017 (0.1)	.175 (1.0)	−.243 (2.1)*
S4	−.039	.020	−.057	.076	.126	−.001	−.243	.118

Notes: S1 = share of payroll spent on professional and managerial employees; S2 = share of payroll spent on technical, sales, and administrative support employees; S3 = share of payroll spent on service employees; S4 = share of payroll spent on all other employees.
LW1 = logarithm of the average hourly wage in category 1. Estimates in the S4 rows are implied by the adding up property.

F Tests		Education	Noneducation
HO	HA		
II	I	F(3,132) = 1.46	F(3,132) = 0.57
III	I	F(6,132) = 1.72	F(6,132) = 1.70

Table 10.17 **Estimates of Local Government Translog Cost Functions for SMSA-Level Major Occupational Group Data: Instrumental Variables (absolute value t-statistics)**

	Education (N = 177)				Noneducation (N = 177)			
	LW1	LW2	LW3	LW4	LW1	LW2	LW3	LW4
I. No restrictions								
S1	−.488 (1.6)	.410 (1.9)*	.047 (0.2)	.037 (0.3)	.279 (1.2)	.487 (1.2)	−.687 (1.4)	.415 (0.8)
S2	.221 (1.9)*	−.057 (0.7)	−.098 (1.2)	−.049 (1.0)	−.021 (0.1)	.735 (2.8)*	−.495 (1.6)	.065 (0.1)
S3	.215 (1.4)	−.227 (2.2)*	−.045 (0.4)	−.039 (0.6)	−.270 (1.9)*	−.277 (1.1)	.575 (1.9)*	−.267 (0.9)
S4	.052	−.126	.006	.051	.012	−.945	.607	−.213
II. Homogeneity								
S1	−.500 (1.8)*	.414 (1.9)*	.047 (0.2)	.040 (0.3)	.097 (0.4)	−.357 (1.4)	−.242 (0.5)	.503 (1.0)
S2	.195 (1.9)*	−.051 (0.6)	−.099 (1.2)	−.044 (0.9)	−.126 (019)	.250 (1.4)	−.240 (0.8)	.116 (0.4)
S3	.226 (1.6)	−.229 (2.2)*	.046 (0.4)	−.041 (0.6)	−.181 (1.3)	.133 (0.8)	.359 (1.3)	−.311 (1.0)
S4	.079	−.134	.006	.045	.210	−.026	.123	.308
III. Homogeneity and symmetry								
S1	−.522 (1.9)*	.216 (2.1)*	.222 (1.6)	.083 (1.0)	−.020 (0.2)	−.208 (2.4)*	−.085 (1.0)	.313 (2.8)*
S2	.216 (2.1)	−.002 (0.0)	−.148 (2.8)*	−.065 (2.1)*	−.208 (2.4)*	.360 (3.6)*	.010 (0.1)	−.161 (1.4)
S3	.222 (1.6)	−.148 (2.8)*	−.021 (0.3)	−.051 (1.3)	−.085 (1.0)	.010 (0.1)	.233 (1.0)	−.158 (0.2)
S4	.083	−.065	−.051	.033	.313	−.161	−.158	.006

Notes: S_i and LW_i are defined as in table 10.16.

F Tests		Education	Noneducation
HO	HA		
II	I	F(3,516) = 0.93	F(3,516) = 4.47(R)
III	I	F(6,516) = 0.89	F(6,516) = 2.52(R)

R = reject HO at .05 level.

using an instrument for each of the wage variables and an estimation method that takes account of the correlation of the error terms across equations.[37]

These estimates provide mixed support for the translog specification. On the one hand, in three of the four systems (education/state, noneducation/state, education/local) one cannot reject the hypothesis that the homogeneity and symmetry restrictions (equations 8 and 9) are satisfied. On the other hand, the majority of the individual regression coefficients are statistically insignificantly different from zero in all of the systems estimated. One senses that this contributes to the above results. Moreover, the own-wage elasticities of demand they imply when symmetry and homogeneity are imposed (table 10.18) are negative in only nine of the sixteen cases.

The mixed nature of these results suggest that one should take predictions they generate with a grain of salt. Nonetheless they can be used, along with knowledge of the share of expenditures on each category, the proportion of hours worked by females in each category, the male and female wages in each category, female employment in each category, and an assumption about what CWWA would do to female wages, to generate predictions about the effect of CWWA on female employment due to substitution away from female-dominated occupations, holding the total employment budget constant. The appendix sketches somewhat formally how this is done. Illustrative simulations appear in table 10.19, where we have assumed CWWA would raise the wage of all female employees by 20 percent.[38]

Although the implied percentage changes in female employment in each occupation varies across industry (education or noneducation) and sector (state or local), the implied average change in overall female employment is remarkably similar across industry and sector. The 20 percent CWWA is predicted to reduce female employment in education

Table 10.18 Estimates of Own-Wage Elasticities of Demand for State and Local Government Employees by Occupation (mean share of payroll)

	State Government		Local Government	
	Education	Noneducation	Education	Noneducation
Professional et al.	−.207 (.731)	−.633 (.453)	−.816* (.820)	−.791 (.280)
Technical et al.	−.880 (.147)	−.276 (.267)	−.961 (.068)	.961 (.205)
Service	1.593* (.080)	.303 (.152)	−1.191 (.078)	.750 (.301)
Other	.850 (.042)	.050 (.128)	.005 (.034)	−.757 (.214)

Notes: Derived from own-wage coefficients in tables 10.16 and 10.17 (homogeneity and symmetry constrained specifications), mean share of payroll spent on the category, and equation (7) in the text.

*Estimated based on statistically significant regression coefficient.

Table 10.19 Implied Percentage Effects of a 20 Percent CWWA for All Females on the Employment of Females in State and Local Governments Due to Occupational Substitution, Total Employment Budget Held Constant

	State Employees		Local Employees	
	Education	Noneducation	Education	Noneducation
Mean percentage change in female employment in				
Professional	−6.2	−8.7	−15.6	−12.5
Technical and support	−4.9	−6.8	21.5	−3.9
Service	−6.0	2.8	14.4	−2.2
Other	−7.4	2.6	10.4	5.5
Overall	−5.9	−5.5	−5.9	−5.4
Minimum change observation	−4.3	−3.3	−1.3	0.1
Maximum change observation	−9.3	−7.1	−12.1	−11.9

Source: Authors' calculations using the method described in the appendix, the coefficients from the homogeneity and symmetry constrained regressions reported in tables 10.16 and 10.17, and the underlying census data.

by almost 6 percent and female employment in noneducation by about 5.5 percent. These figures are the averages for all observations in the sample; as the bottom rows of the table suggest, the predicted losses vary across observations, with the range of predicted losses being larger for local government employees.

We must stress, however, that these simulations assume that the total employment budget remains constant in the face of the CWWA. This is roughly equivalent to assuming that in the aggregate the wage elasticity of demand for state and local government employees is unity. That is, they assume that any given increase in the average wage of state and local government employees would result in an equal percentage decrease in aggregate state and local government employment.

In fact, studies of the aggregate (by function) wage elasticity of demand for state and local government employees typically find wage elasticities of demand that are less than unity.[39] Thus, an increase in the average wage would increase the total employment budget; the calculations in table 10.19 therefore overstate the decline in female employment that would occur.

Some idea of the magnitude of the overstatement can be obtained from the following crude calculations. Based on knowledge of the ratios of male to female wages and of male to female hours in each industry/sector, we calculate that a 20 percent increase in wages for females would increase the average wages of state education, state noneducation, local education, and local noneducation employees by about 8 percent, 7.5 percent, 11.5 percent, and 5.5 percent, respectively.[40] It is reasonable to take −.5 as a "best" estimate of the aggregate wage elasticity of demand for noneducational employees in the state and local sector and −.75 as the comparable estimate for educational employees (Ehrenberg and Schwarz 1986, table 3). These elasticities imply employment budget increases for state education, state noneducation, local education, and local noneducation, respectively, of 2 percent, 3.75 percent, 2.9 percent, and 2.75 percent. Such increases would reduce the female employment declines predicted by table 10.13 by roughly half.

In sum, our simulations suggest that the decline in female employment caused by a 20 percent CWWA for all female employees in the state and local sector would be quite small, probably falling in the range of 2 percent to 3 percent. These somewhat surprisingly small estimates are a direct result of our inability to find much substitutability of males for females within major occupational groups, or much substitutability across major occupational groups as relative wages change.[41]

10.6 Concluding Remarks

At the theoretical level, we conclude that the case for comparable worth rests on the argument that the current distribution of female employees is based on discriminatory barriers which existing legislation have not broken down. If this argument is valid, the desirability of comparable worth depends upon one's perceptions of how the benefits it provides contrasts with the efficiency losses it induces. Given the trade-offs involved, ultimately one's position on comparable worth must depend on value judgments.

Turning to the public sector, our empirical analyses in section 10.3 suggest that existing estimates of comparable worth wage gaps in the states of Connecticut, Minnesota, and Washington are relatively insensitive to the functional form of the earnings equation estimated and to whether total job points are decomposed into their individual factor point scores. While these results should be gratifying to proponents of comparable worth, we stress the need to perform sensitivity analyses of the type we have undertaken for studies of other governmental units in the future. These results are based on job evaluation systems (Hay or Willis) that purport to measure four distinct characteristics of jobs; in the case of the Hay system, these are know-how, problem solving, accountability, and working conditions. As described in section 10.3, the latter characteristic is obviously measured with substantial error and the first three are so highly correlated that it is unlikely they capture more than one dimension of a job. As a result, we must be skeptical about what these job evaluation systems are actually measuring. If job evaluation systems are to be used in comparable worth studies, we suggest that more thought be given to their design.

Our analyses in section 10.4 call attention to the need to focus on forms of compensation in addition to current wages and working conditions in judging the "total" compensation of a job. In particular, we stressed the need for longitudinal earnings data for individuals initially in each job category to test if observed occupational wage differentials are partially compensating differentials for different opportunities for occupational mobility.

Finally, our analyses in section 10.5 find little evidence that intraoccupational male/female employment ratios in the SLG sector are sensitive to intraoccupational male/female wage ratios or that the SLG occupational distribution of employment is sensitive to the SLG occupational distribution of wages. These results imply, in our simulations, that the decline in female employment caused by a CWWA for all female SLG employees would be surprisingly small. Indeed, we estimate that a 20 percent CWWA for all SLG female employees would lead to only a 2 percent to 3 percent decline in female employment.

Opponents of comparable worth might claim these estimates are much too low and point to problems in our empirical analyses. These problems include using broad definitions of occupations (only four), aggregating all noneducation employees into one group, aggregating all governmental units in an SMSA together, basing analyses often on small sample sizes, and using wage variables that are subject to considerable measurement error. Our analyses were dictated by the nature of the census data we used, and we hope to undertake analyses in the future of other data bases (see n. 33) that would provide larger sample sizes, greater functional breakdowns, and data at the individual governmental level. Moreover, now that several states have begun to adopt comparable worth, the employment effects of the policy may be directly inferred after a few years from their experiences. However, while our personal priors were that we would find larger estimates of potential job loss for females, it seems reasonable at least temporarily to take our current findings at face value.

We should stress, however, that a CWWA policy would have additional repercussions. Some males in the sector would also lose their jobs, and if these displaced males and females sought employment in the private sector, downward pressure would be placed on wages there. Indeed, if a CWWA policy were confined to the public sector, it is not obvious that women as a group would benefit; the higher wages for women employed in the public sector may be at least partially offset by resulting lower wages for women in the private sector.

Appendix A

Table 10.A.1 F Tests to Test Alternative Functional Forms for the Male Equations in Various State Data Sets

	Salary Equations			Log Salary Equations		
Sample	(1)	(2)	(3)	(1)	(2)	(3)
Connecticut	4.32*	11.97*	0.68	4.42*	11.96*	0.89
Minnesota	2.23	0.00	3.30*	6.57*	0.66	9.50*
Washington (min.)	1.83	0.01	2.70	1.21	0.05	1.76
Washington (max.)	2.63	1.48	3.23*	1.30	0.77	1.56
Washington (ave.)	2.24	0.62	3.02	1.32	0.21	1.84

Notes: Let *DV* be the dependent variable and *HP* represent either Hay or Willis points. Remembering that $HPT = HP1 + HP2 + HP3 + HP4$ and $HP5 = HP1 + HP2 + HP3$, the equation estimated in each case is

$DV = a_0 + a_1HP_1 + a_2HP_2 + a_3HP_3 + a_4HP_4$. Then

(1) Ho: $a_1 = a_2 = a_3 = a_4$, Ha: no constraints on a_1, a_2, a_3, a_4;

(2) Ho: $a_1 = a_2 = a_3 = a_4$, Ha: $a_1 = a_2 = a_3$, a_4 free to vary;

(3) Ho: $a_1 = a_2 = a_3$, Ha: no constraints on a_1, a_2, a_3, a_4.

*Reject the null hypothesis (Ho) in favor of the alternative hypothesis (Ha) at the .05 level of significance.

Appendix B

Estimating Female Employment Losses Caused by CWWA Due to Changes in the Occupational Mix

Let W_{Mj} be the wage of males in occupation j, W_{Fj} the wage of females in occupation j, and P_j the proportion of hours worked by females in the occupation. The average wage in the occupation W_j is given by

(A1) $$W_j = W_{Mj}(1 - P_j) + W_{Fj}P_j.$$

Differentiating with respect to the female wage and then multiplying both sides by the ratio of the female wage to the average wage, one obtains

(A2) $$(\partial W_j/\partial W_{Fj})(W_{Fj}/W_j) = P_jW_{Fj}/(P_jW_{Fj} + (1 - P_j)W_{Mj})$$

or

(A3) $$\%\Delta W_j \approx \%\Delta W_{Fj}[P_j/(P_j + (1 - P_j)(W_{Mj}/W_{Fj}))].$$

If CWWA lead to the same percentage increase in female wages in each occupation c, then the percentage change they induce in the average wage in occupation j is

(A4) $$\%\Delta W_j \approx cP_j/(P_j + (1 - P_j)(W_{Mj}/W_{Fj})).$$

Now from the translog cost function share equation (6) in the text,

(A5) $$dS_i = \sum_{j=1}^{4} a_{ij} d \log W_j \approx \sum_{j=1}^{4} a_{ij}(\%\Delta W_j).$$

The share of expenditures spent on each occupational category is given by

(A6) $$S_i = W_i E_i / \sum_{j=1}^{4} W_j E_j,$$

where employment in each occupation, E_j, is measured in person hours. If we hold the total employment budget (the denominator of A6) constant, taking the logarithm of both sides and then the total differential, one obtains

(A7) $$(1/S_i)dS_i = d \log S_i = \mathrm{d} \log W_i + \mathrm{d} \log E_i \approx \%\Delta W_i + \%\Delta E_i.$$

One can substitute equation (A5) into equation (A7) and solve for $\%\Delta E_i$ to obtain

(A8) $$\%\Delta E_i \approx [(1/S_i)\sum_{j=1}^{4} a_{ij}(\%\Delta W_j)] - \%\Delta W_i.$$

Equations (A4) and (A8) together yield that predicted percentage change in total employment in each occupation induced by the CWWA.

How would female employment change? Since we have assumed (based on the results in tables 10.14 and 10.15) that CWWA would lead to no male-female substitution within an occupation, female employment would change in each occupation by the same percentage as total employment. As a result, if E_{Fj} is the initial level of female employment in occupation j (measured in hours), the overall percentage effect on female employment due to the changing occupational mix ($\%\Delta E_F$) is given by

(A9) $$\%\Delta E_F = \sum_{j=1}^{4} (\%\Delta E_j) E_{Fj} / \sum_{j=1}^{4} E_{Fj}.$$

Notes

We are grateful to Daniel Sherman and Richard Chaykowski for their research assistance and to Eileen Driscoll and Ann Gerken for their assistance in obtaining and manipulating the Census of Population files used in the paper. Without implicating them for what remains, we are grateful to numerous colleagues at Cornell and the NBER and to Mark Killingsworth, Sharon Smith, and Helen Remick for their comments on an earlier draft. Our specific debts to other individuals are acknowledged throughout the chapter.

1. This statement is attributed in a number of places to former EEOC chair Eleanor Holmes Norton.

2. Explanations for this occurrence include the following: public decision makers are more likely to be swayed by public opinion calling for such policies than are private profit-maximizing firms; and increases in female wages in the public sector caused by comparable worth wage adjustments are likely to lead to only small employment losses because the demand for public employees is likely to be inelastic. Empirical evidence for Australia, where a similar policy was implemented, provides some support for the latter claim (see Gregory and Duncan 1981); see section 10.5 for evidence we offer for the United States.

3. Tables 10.1 and 10.2 and the next two paragraphs draw heavily on research being conducted by our colleague Alice Cook. We are grateful to Cook for sharing her materials with us; she is not responsible for our interpretations of them. For earlier evidence on the spread of comparable worth in the state and local sector, see Cook 1983 and National Committee on Pay Equity 1984.

4. In *AFSCME v. State of Washington*. This order was subsequently overturned by a federal court of appeals; the state and the union then entered into a voluntary agreement in February 1986 to begin to implement comparable worth effective April 1, 1986.

5. While our empirical analyses focus on the state and local sector, there is considerable interest in the federal sector as well. Hearings on comparable worth have been conducted by several congressional committees, for example, U.S. House of Representatives 1982.

6. See Bergmann 1984 and Killingsworth 1984a, 1984b, and 1984c, respectively, for more complete analytical treatments of the cases for and against comparable worth.

7. That job evaluation scores must be reconsidered as internal and external conditions change has long been recognized by institutional economists. For a recent discussion, see Schwab 1984.

8. Another possible efficiency loss is the reduced incentive females would have to obtain training for the higher-paying "male" occupations, since increasing the wage in "female" occupations via comparable worth wage adjustments reduces the return to training investments.

9. See Ehrenberg and Schwarz 1986, for citations to the literature.

10. This point has been made by Killingsworth 1984c.

11. Another remedy would be lump sum payments specified as a function of years of service in the occupation. This remedy would have the advantage of making its size a function of the magnitude of the loss and would not reduce employment of women in the occupation.

12. See Treiman 1979 for a discussion of current job evaluation schemes.

13. These are defined as follows: "Know How is the sum total of every kind of skill; however acquired, needed for acceptable job performance"; "Problem

Solving is the original 'self-starting' thinking required by the job for analyzing, evaluating, creating, reasoning, arriving at, and making conclusions"; "Accountability is the answerability for an action and for the consequences thereof"; "Working Conditions are made up of physical effort, environment and hazards." See Treiman 1979, 161–65 for elaborations of these definitions and copies of the Hay System Guide Charts for assigning points for each of the factors.

14. Others have suggested similar approaches, for example, Treiman and Hartmann 1981 and Pierson, Koziara, and Johannesson 1984. Some, however, resist any determination of factor weights that use existing wage scale data, arguing that these weights will reflect the net effects of any market discrimination that exists. See, for example, R. C. Blumrosen 1979.

15. The discussion in this paragraph comes from a November 10, 1983, telephone conversation with James Lee of the Minnesota Department of Employee Relations and from an August 6, 1984, letter from Helen Remick.

16. Council on the Economic Status of Women 1982, Appendix I. While only maximum salary data were available for Minnesota, results we report below for the state of Washington suggest that the use of average or minimum wage scale data would not appreciably change the results.

17. Eleven of the titles in the original study did not appear in the latter list. Twenty-seven others were either upgraded or downgraded so that the total Hay Point Scores for the title did not match on the two data sources. It is interesting to note that the male job titles were much more likely to be upgraded than female titles (11.5 percent versus 3.5 percent). This may reflect systematic errors that led to the undergrading of male jobs in the original evaluations or systematic attempts to overgrade male jobs to protect customary wage differentials in the latter. Without further information one cannot conclude whether either hypothesis is correct.

18. The Hay Point System used in Minnesota assigns working condition points only to non-exempt jobs and *defines* most clerical jobs as having normal working conditions (and therefore zero working condition points). This is an example of how existing job evaluation plans may be sex biased and leads one to consider how systematic sex-based measurement errors might influence estimates of comparable worth wage gaps. Schwab and Wichern 1983 addresses this issue and discusses the usefulness of reverse regression methods in ascertaining if such measurement errors exist.

19. That compensable factors in factor point systems are often redundant has long been recognized. See Schwab 1984 for citations to the literature. That the Hay Point System (in these data) leads in actuality to only two factors, at least one of which is subject to considerable measurement error, is probably less well known.

20. Somewhat strikingly, adding the percentage of female employees in an occupation (*FEM*) to either the male or female wage equations results in that variable's having a negative coefficient (cols. 1a, 4a). Even in female-dominated occupations, an increase in the female share of employment leads to lower wages.

21. See Remick 1980 and 1984, for a more complete discussion of the Washington study.

22. See Remick 1980 for a discussion of the Willis system.

23. Percentage of females in the occupation was not available in these data.

24. The unweighted mean is used here because occupational employment levels were not available.

25. The next two paragraphs are drawn from material in Cook 1983, which should be consulted for more details.

26. Salary information was obtained from charts in Willis and Associates 1980, which plotted annual compensation versus total Hay points for broad job families. Since compensation was rounded to the nearest $200 there, it is not surprising that the R^2 in table 10.10 are smaller than the comparable ones in tables 10.4 and 10.7. In several cases where a male and a female job (*a*) were in the same job family, (*b*) had identical Willis points, and (*c*) paid different salaries, it proved impossible for us to assign the salaries to each job. As a result, six male and six female jobs in the original survey were excluded from our sample.

27. Formal F tests of whether the implicit weights on each factor differ in the male wage equations are found in table 10.A.1 for all three states.

28. A study that does this for a sample of job titles in Michigan, as well as contrasting the results of two different job evaluation methods, is Young, n.d. Treiman 1984 has stressed that factor weights can have substantial effects on the rankings of jobs if the factors are not highly correlated.

29. This creates obvious selection bias problems because we are ignoring the opportunity for mobility out of the government sector.

30. While the three-digit census occupation breakdown is the most detailed one available in the data, its categories are actually quite broad. In our sample only 16 percent of the individuals changed occupations over the five-year period.

31. Given our knowledge of the relative steepness of male and female age-earnings profiles in the population, this result is not unexpected.

32. Another nonwage factor that may be important is turnover costs. If two job titles rated to be of comparable worth required the same firm-specific training investments, but turnover was higher in the first position, employers would necessarily pay lower wages to employees in that job title. Testing to see if this was a contributing factor to estimated comparable worth wage gaps requires data on quit rates by job title. One must be cautious in drawing inferences here; as is well known, low wages also lead to higher quits, which makes it difficult to infer the direction of causation.

33. We currently are negotiating with the EEOC for more detailed data on a function/occupation/sex breakdown and hope to use these data in later work.

34. Only 27 percent of the government employees in the New York data used in section 10.4 were employed in public administration.

35. The A sample contains data for fifty states and 180 SMSAs. At the time these analyses were undertaken, however, the data tape for Colorado (and its 3 SMSAs) was not available at Cornell.

36. Implicit in this formulation is the notion that public sector decision makers have well-defined utility functions that depend on the per capita employment levels of various categories of public employees and that the parameters of these functions do not vary systematically across areas with public employee wages. For discussions of this approach and analyses that use functional rather than occupational data, see Ashenfelter and Ehrenberg 1975 and Ehrenberg 1973.

37. The need for instrumental variables can be illustrated in the two-occupation case. Let $M_i(F_i)$ be the number of male (female) hours employed in occupation i and $W_{Mi}(W_{Fi})$ the wage rate of males (females) in occupation i. Then the shares (S_i) and average wages (W_i) in the two occupations are given by

$$S_1 = (W_{M1}M_1 + W_{F1}F_1)/(W_{M1}M_1 + W_{F1}F_1 + W_{M2}M_2 + W_{F2}F_2);$$

$$S_2 = (W_{M2}M_2 + W_{F2}F_2)/(W_{M1}M_1 + W_{F1}F_1 + W_{M2}M_2 + W_{F2}F_2);$$

$$W_1 = (W_{M1}M_1 + W_{F1}F_1)/(M_1 + F_1);$$

$$W_2 = (W_{M2}M_2 + W_{F2}F_2)/(M_2 + F_2).$$

It is obvious that each S_i is positively correlated with its own wage rate and negatively correlated with the other wage rate; these correlations would bias the coefficient estimates of equation (6).

To remove these mechanical correlations, instruments for the occupational wage rates are created by regressing these wage rates on median income in the area, area population, male and female wages in the area (state data only), and mean ages and education levels of males and females in the occupation. The system is then estimated using the 3SLS option in SAS.

38. This figure is consistent with the comparable worth wage gap estimates presented in section 10.3 for Connecticut, Minnesota, and Washington. A lower figure would yield proportionately lower employment loss estimates.

39. See Ehrenberg and Schwarz, 1986, table 3, for a summary of the results from all these studies.

40. These are crude calculations that ignore the interoccupational substitution that would take place.

41. We should stress that these simulations also ignore the possibility that CWWA may increase the attractiveness of "female" occupations to males and reduce the extent to which females are excluded from "male" occupations (since the wage advantage in "male" jobs would no longer exist). These factors would create additional, conflicting, pressures on female employment levels. They also ignore any effects of the increased total public sector employment budget on private sector employment levels.

References

Ashenfelter, Orley, and Ronald G. Ehrenberg. 1975. The demand for labor in the public sector. In *Labor in the public and nonprofit sectors,* ed. Daniel S. Hamermesh. Princeton: Princeton University Press.

Bergmann, Barbara. 1984. Why wage realignment under the rubric of "comparable worth" makes economic sense. In *New directions for research on comparable worth,* ed. Heidi Hartmann. Washington, D.C.: National Academy Press.

Blumrosen, R. G. 1979. Wage discrimination, job segregation, and Title VII of the Civil Rights Act of 1964. *University of Michigan Journal of Law Reform* 12:397–502.

Box, G., and D. Cox. 1964. An analysis of transformation. *Journal of the Royal Statistical Society,* series B, 26:211–52.

Cook, Alice, 1983. *Comparable worth: The problem and states' approaches to wage equity.* Industrial Relations Center, University of Hawaii at Manoa.

Council on the Economic Status of Women. 1982. *Pay equity and public employment.* St. Paul, Minn.

Ehrenberg, Ronald G. 1973. The demand for state and local government employees. *American Economic Review* 63:366–79.

Ehrenberg, Ronald G., and Joshua Schwarz. 1986. Public sector labor markets. In *Handbook of labor economics*, ed. Orley Ashenfelter and Richard Layard. Amsterdam: North Holland Press.

Gregory, Robert, and Robert Duncan. 1981. Segmented labor market theories and the Australian experience of equal pay for women. *Journal of Post Keynsian Economics* 3:403–29.

Hamermesh, Daniel. 1986. The demand for labor in the long run. In *Handbook of labor economics*, ed. Orley Ashenfelter and Richard Layard. Amsterdam: North Holland Press.

Hamermesh, Daniel, and James Grant. 1979. Econometric studies of labor: Labor substitution and their implications for policy. *Journal of Human Resources* 4:518–42.

Hartmann, Heidi, ed. 1984. *New directions for research on comparable worth.* Washington, D.C.: National Academy Press.

Killingsworth, Mark. 1984a. The case for and economic consequences of comparable worth: Analytical empirical and policy questions. In *New directions for research on comparable worth*, ed. Heidi Hartmann. Washington, D.C.: National Academy Press.

———. 1984b. Heterogeneous preferences, compensating wage differentials, and comparable worth. Mimeo.

———. 1984c. Statement on comparable worth. Testimony before the Joint Economic Committee of the U.S. Congress.

Minnesota. Department of Employee Relations. 1983. Summary of evaluations by title. Computer printout.

National Committee on Pay Equity. 1984. *Who's working for working women: A survey of state and local government pay equity activities and initiatives.* Washington, D.C.

Pierson, David, Karen Koziara, and Russell Johannesson. 1984. A policy capturing application in a union setting. In *Comparable worth and wage discrimination*, ed. Helen Remick. Philadelphia: Temple University Press.

Remick, Helen. 1980. Beyond equal pay for equal work: Comparable worth in the state of Washington. In *Equal employment policy for women*, ed. Ronnie Ratner. Philadelphia: Temple University Press.

———. 1984. Major issues in a priori applications. In *Comparable worth and wage discrimination*, ed. Helen Remick. Philadelphia: Temple University Press.

Schwab, Donald. 1984. Job evaluation research and research needs. In *New directions for research on comparable worth*, ed. Heidi Hartmann. Washington, D.C.: National Academy Press.

Schwab, Donald, and Dean Wichern. 1983. Systematic bias in job evaluation and market wages: Implications for the comparable worth debate. *Journal of Applied Psychology* 68:60–69.

Treiman, Donald. 1979. *Job evaluation: An analytic review.* Washington, D.C.: National Academy of Sciences.

———. 1984. Effects of choice of factors and factor weights in job evaluations. In *Comparable worth and wage discrimination*, ed. Helen Remick. Philadelphia: Temple University Press.

Treiman, Donald, and Heidi Hartmann, eds. 1981. *Women, work and wages: Equal pay for jobs of equal value.* Washington, D.C.: National Academy Press.

U.S. Bureau of the Census. 1972. *1972 city and county data book*. Washington, D.C.: Government Printing Office.
———. 1983. *1980 census of population: Characteristics of the population—General social and economic characteristics*. Washington, D.C.: Government Printing Office.
———. 1984. *1980 census of population: Characteristics of population—Detailed population characteristics*. Washington, D.C.: Government Printing Office.
U.S. House of Representatives. Committee on Post Office and Civil Service. 1982. *Pay equity: Equal pay for work of comparable value*. Washington, D.C.: Government Printing Office.
Washington. Department of Personnel. 1974. *Compensation plan*.
Willis, Norman D., and Associates. 1976. *State of Washington comparable worth study, phase two*.
———. 1980. *State of Connecticut objective job evaluation pilot study*.
Young, Arthur, n.d. *A comparable worth study of the State of Michigan job classifications*. Report submitted to the Office of Women and Work, Michigan Department of Labor.

Comment James L. Medoff

The chapter by Ronald Ehrenberg and Robert Smith is both interesting and informative. It provides a careful and lucid presentation of the cases for and against comparable worth. Also, it gives a complete description of which state and local governments have taken various comparable worth actions.

The chapter's first finding is that aggregating across factor point categories such as know-how, problem solving, accountability, and working conditions, does not significantly affect the ability of factor points to explain the pay differential between "male" and "female" jobs. What is even more important, I believe, is that controlling for either an aggregate score or a vector of different scores, the male/female wage differential in the states under analysis was about 20 percent. This 20 percent differential is almost precisely what one finds when one uses a sample of Current Population Survey data for all state government employees and regresses usual hourly earnings (in logarithmic units) on years of education, years of service and its square, state of residence, and sex. (The May 1978 Current Population Survey was used for this analysis.) This makes good sense because the amount of know-how, problem-solving ability, and accountability on a job are most likely going to be highly correlated with the amount of education and years of service of those who are given the job. Moreover, it

James L. Medoff is professor of economics at Harvard University and a research associate of the National Bureau of Economic Research.

underscores that standard factor point methods can explain no more of the male/female wage differentials than can simple human capital variables.

The chapter's second finding is that the lower pay of women in the public sector cannot be explained by the fact that their earnings growth is likely to be greater than that of males: the evidence indicates that just the opposite is true. This result is consistent with what we know about the private sector, for which it has been concluded that the age-earnings profiles of women are typically flatter than the profiles for men. Because the regressions fit by Ehrenberg and Smith do not control for years of service, the strength of their finding is likely to be understated; women would be expected to have less service than men of a given age, and earnings can be expected to grow much faster in the beginning of one's tenure than at the middle or end.

Next the chapter discusses the efficiency costs of comparable worth actions. The authors believe that one's position on comparable worth should be greatly conditioned by these costs. They draw a parallel to one's views on minimum wages. I do not think this analogy is very good because we have laws that deal explicitly with the treatment of women in the labor market, but we do not have comparable laws dealing with "low-paid" and "high-paid" workers. To me, comparable worth is much more an issue of fairness and implementation than one of economic efficiency, since I would not favor discriminating against any demographic group even if such discrimination significantly increased national income.

The results the authors derive pertaining to the likely efficiency costs of a comparable worth policy are mixed. However, based on the different experiments they conducted, they conclude that the relevant elasticities are likely to be "low," as, therefore, will be the likely efficiency costs of the comparable worth wage adjustments. My experience with trying to derive a similar set of elasticities for the private sector suggests that Ehrenberg and Smith's intuition is very much on the mark. Hence, I believe that both a priori logic and the existing evidence imply that one need pay little attention to the efficiency costs of comparable worth actions.

Understandably, the Ehrenberg/Smith chapter does not resolve the two key questions at hand: What in fact causes the male/female wage differentials observed? What exactly should be done about these differentials? However, the authors have provided information that will contribute to their resolution.

This Page Intentionally Left Blank